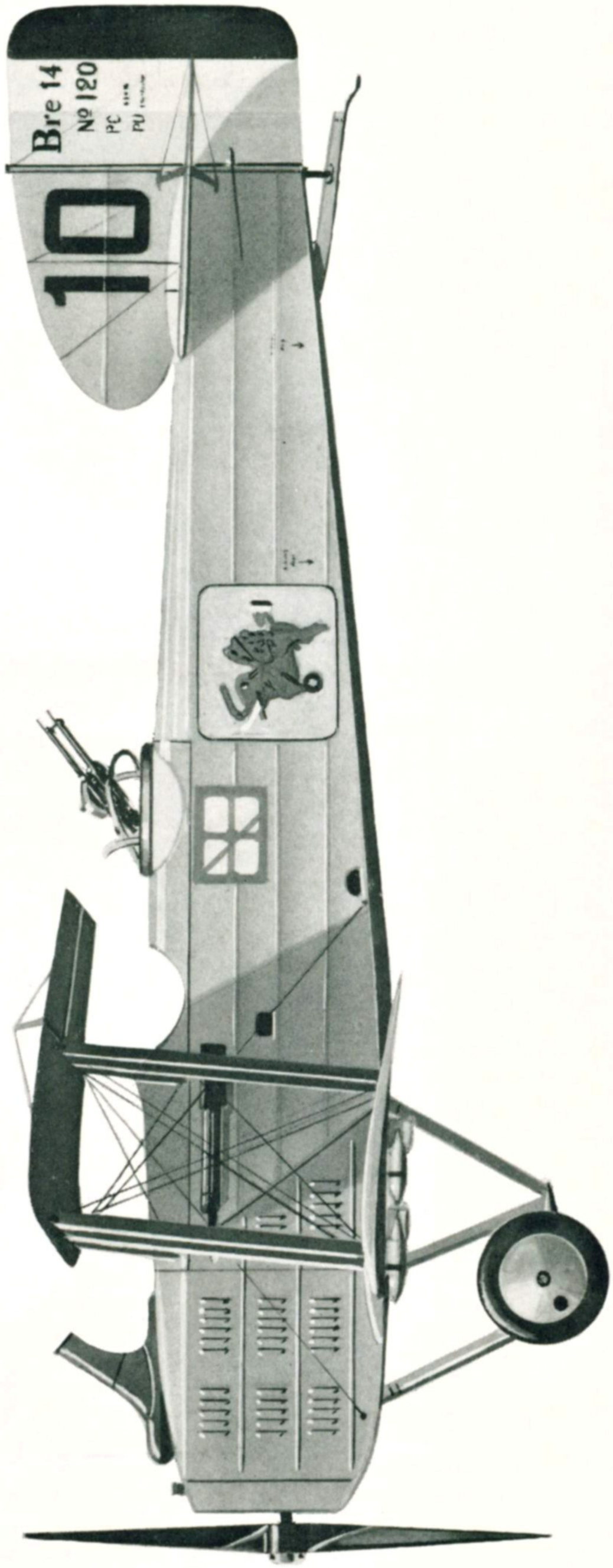
PROFILE PUBLICATIONS

The Breguet 14

NUMBER 157

RETAIL PRICE
UNITED KINGDOM TWO SHILLINGS
UNITED STATES AND CANADA 50 CENTS



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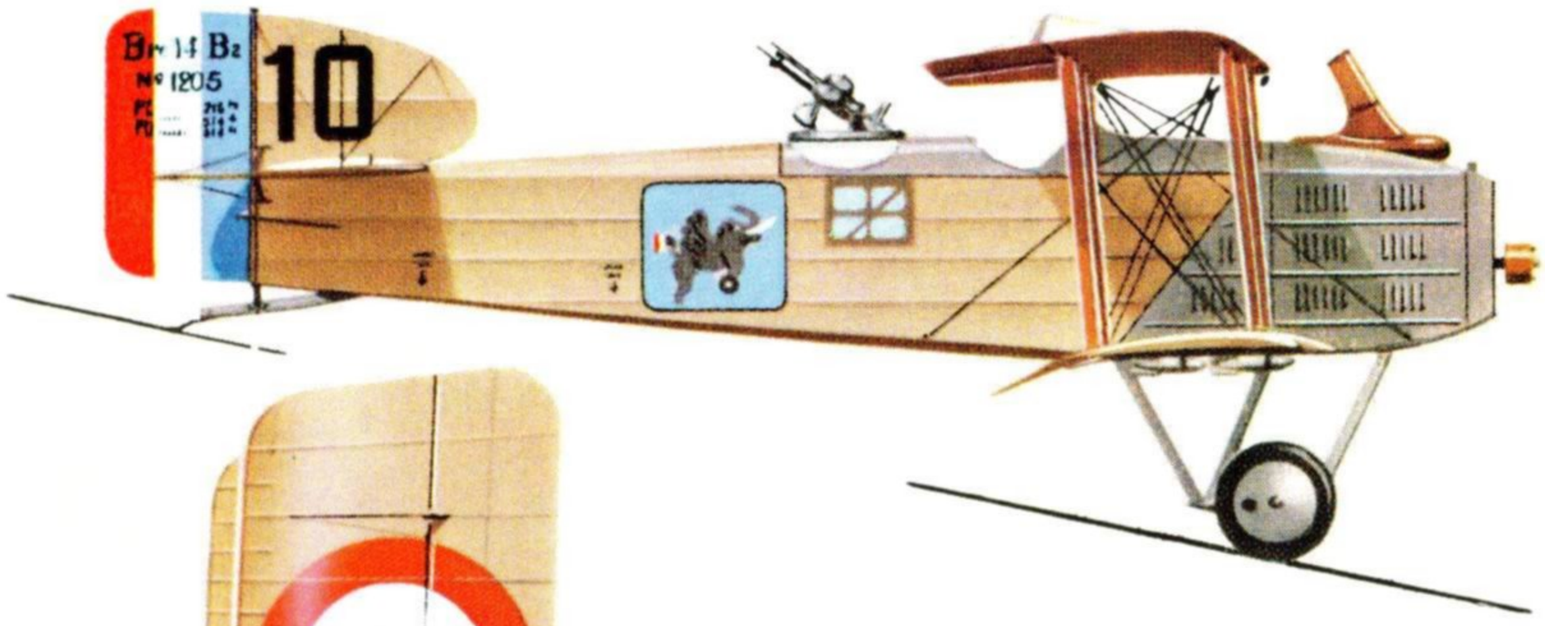
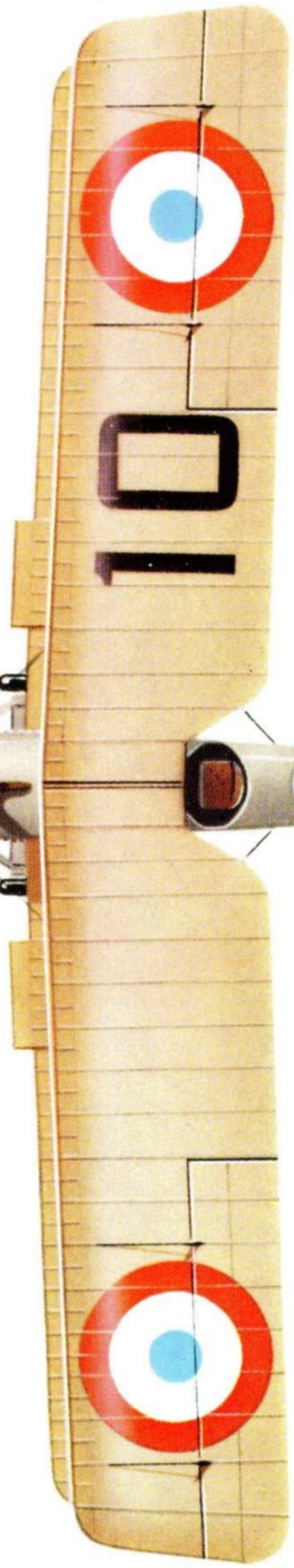
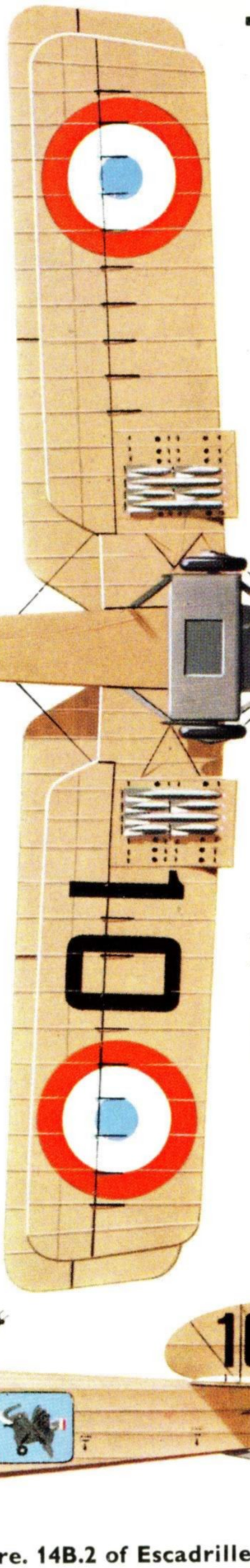






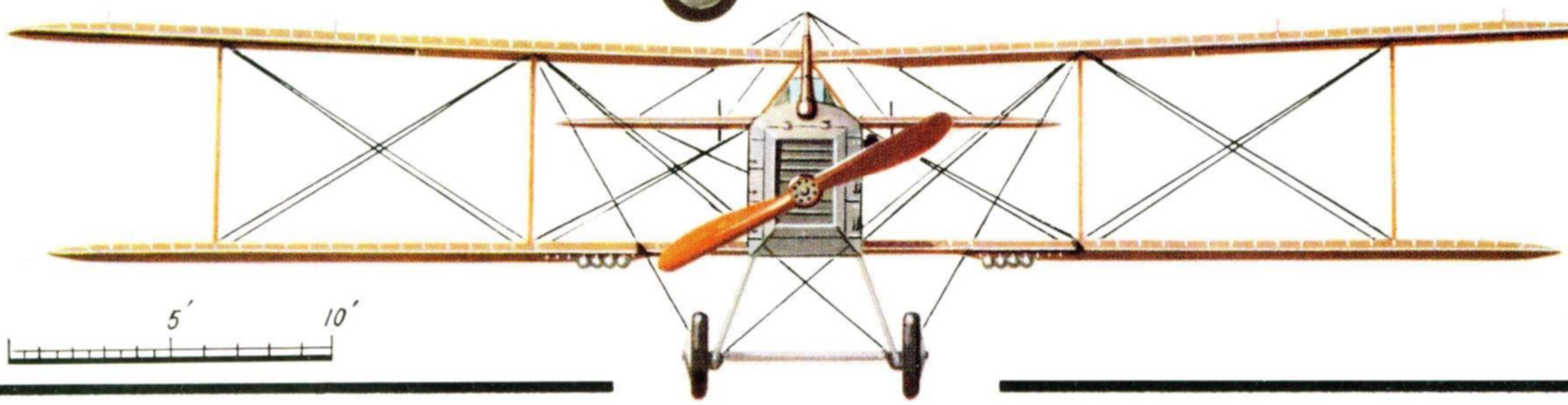
Bre 14 B2
Nº 1205

PC		216 Kgr
PU	normal	514 dc
	maximum	614 dc

Rudder marking detail

Insignia of BR 127

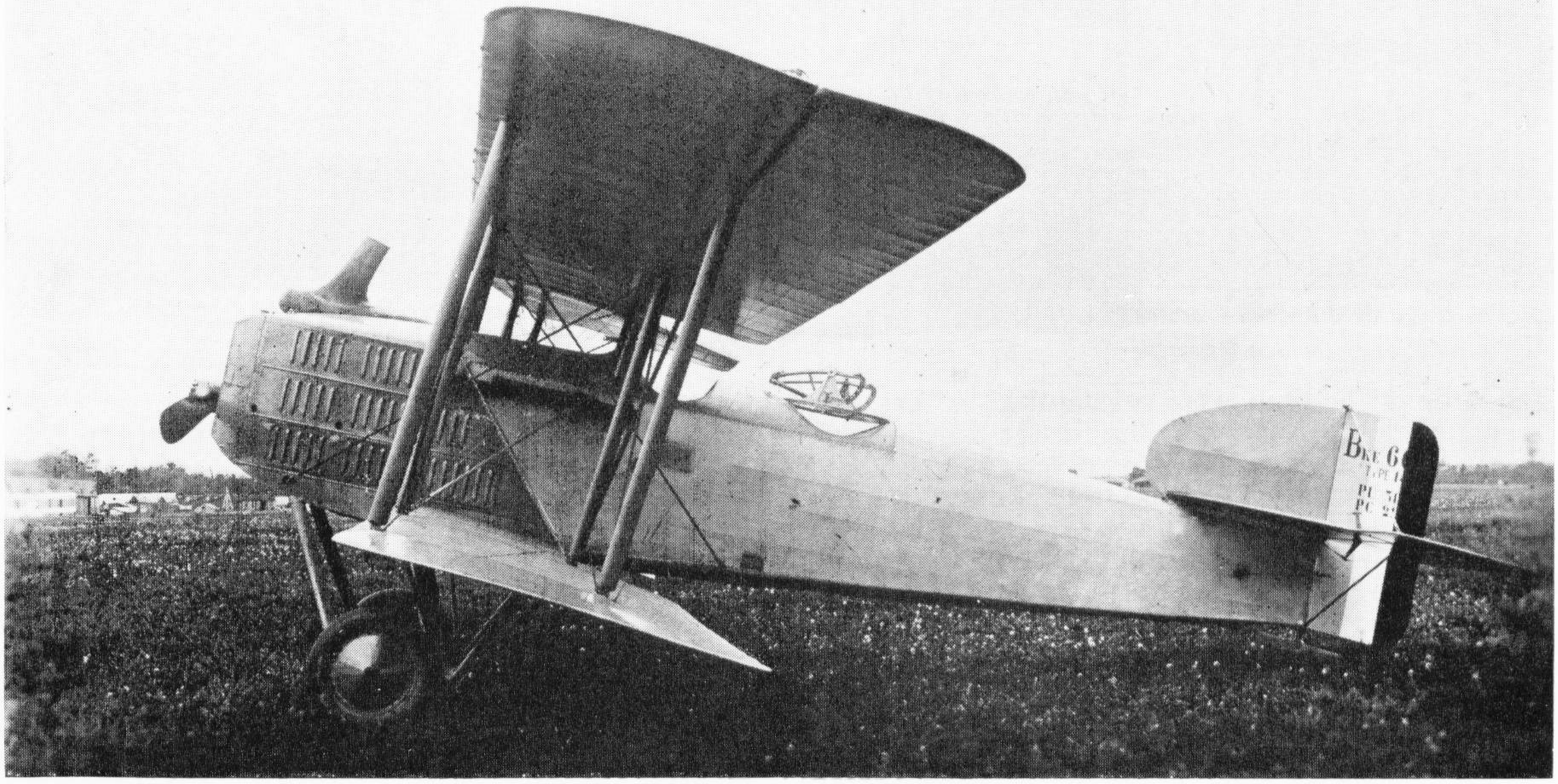
BREGUET Bre. 14B.2 of Escadrille BR 127



5′ 10′

The Breguet 14

by J. M. Bruce & Jean Noel



Early production Breguet 14A2, No. 665, with original rudder, straight trailing edges on mainplanes, and T.O.4 gun mounting on observer's cockpit. (Photo: Musée de l'Air 0837)

The first world war produced a few types of aircraft that were not only redoubtable weapons in their day but served on for many years in the economy-ridden post-war period. In the R.A.F. the Avro 504K, Bristol Fighter and D.H.9A survived to give long service; in France their longevity was matched by the Breguet 14.

Breguet aeroplanes were at no time notable for their aesthetic appeal, and the Breguet 14's ancestors included some extraordinary aircraft. Louis Breguet, born on 1st January 1880 (although his officially registered date of birth was 2nd January), had an early interest in aviation. A great friend of Louis and his brother Jacques was Charles Richet, who had collaborated with the 19th century French pioneers Victor Tatin and Alphonse Pénaud in their early aeronautical experiments, and had aroused in the Breguet brothers a lively interest in mechanical flight. As early as 1897 Louis Breguet, while still a student at the Lycée Carnot, had drawn up in considerable detail the design of an aeroplane powered by a steam engine driving a tractor airscrew by means of a reduction gear.

In 1905 Breguet built an ingenious form of whirling-arm aerodynamic test rig, possibly the most advanced device of its kind to be built up to that time.* In the following year, assisted by his brother and Charles Richet, he turned his energies to the design and construction of a form of four-rotor helicopter, which he named *Gyroplane*. This aircraft first rose from the ground at Douai on 29th Sept.,† 1907 with Volumard, Breguet's chief engineer, aboard. This was the first occasion on which a direct-lift aircraft became airborne; it cannot be said to have flown, however, because there were no flight controls and four men had to stand by to steady the *Gyroplane*.

After his third helicopter, the Breguet-Richet *Gyroplane* No. 2*bis*, had been wrecked in its hangar by a storm, Louis Breguet turned to the design and construction of fixed-wing aircraft. His first biplane, which appeared in 1909, was remarkable for its all-metal airframe: the wings had steel-tube main spars and their ribs were aluminium pressings, and the aircraft had many ingenious features. A 50 h.p. Antoinette engine drove a three-blade tractor airscrew with blades of adjustable pitch. Lateral control was by wing warping, the action being greatly simplified by the use of single interplane struts. Louis Breguet will always be remembered as a leading pioneer of all-metal construction. The pre-war years saw a succession of Breguet biplanes: all were tractors; all had metal airframes; all those that preceded the Type 10 of 1914 had the dangerous-looking arrangement of single interplane struts. On most of the pre-war biplanes the danger inherent in the sketchy interplane bracing and fatigue-prone manner of attaching the ribs to the single main spars was compounded with the use of an extraordinary cruciform tail unit that was attached to the pointed extremity of the fuselage by a universal joint.

Despite their frail and unprepossessing appearance, the pre-war Breguet biplanes were by no means unsuccessful and were built in quantities that, by the

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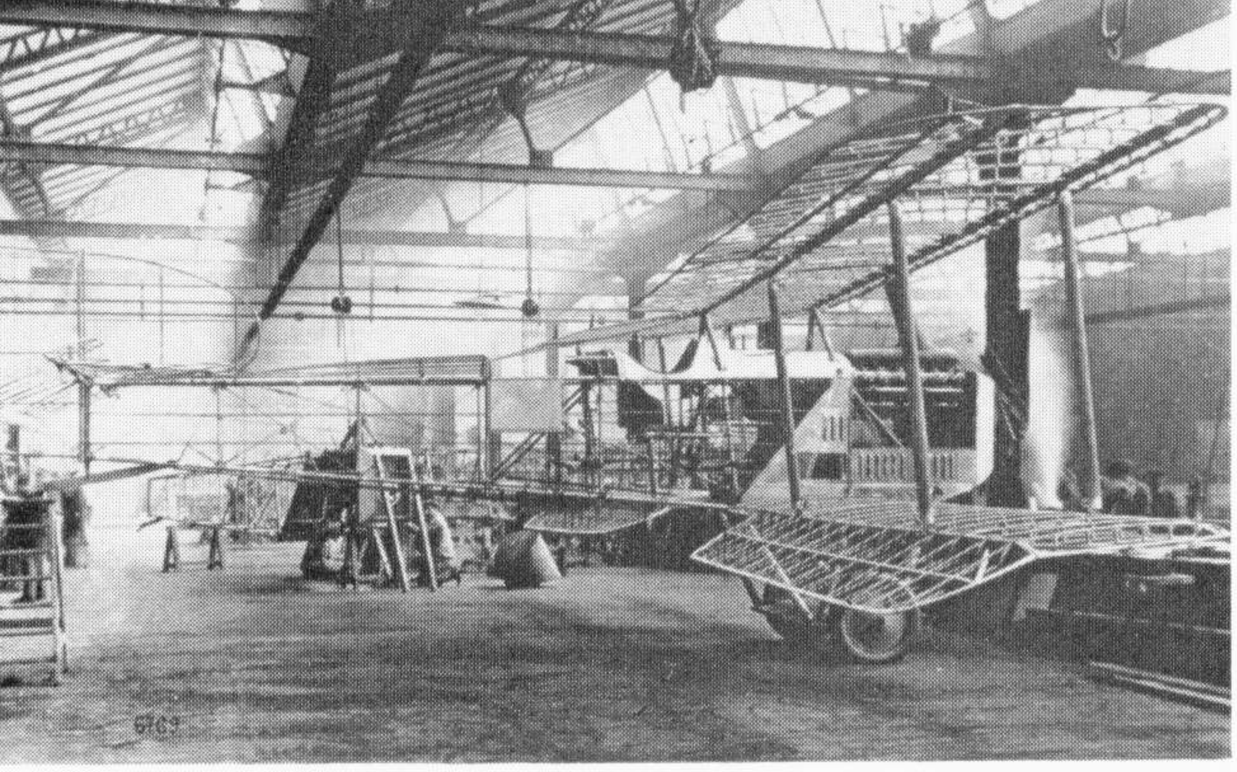
* *The first whirling-arm device for experiments in air resistance was invented by an Englishman, Benjamin Roberts (1707-1751). The first application of a device of this kind to aerodynamics was made by Sir George Cayley in 1804, a full century before Breguet built his* balance aérodynamométrique.

† *In his book* Breguet *Guy Michelet gives the date of this occasion as 24th August 1907.*



Breguet 14B2 under construction. In this skeleton view the flaps on the lower wings can be seen at maximum depression.
(Photo: Fred C. Dickey, Jr.)

he initiated work on the design of a new military two-seater with the designation Breguet AV Type XIV*. The prefix AV signified *avant*, indicating—perhaps with a touch of defiance—that the aircraft had its engine in front. The stress calculations were performed by Breguet's engineer Vullierme.

The official *Section Technique de l'Aéronautique* (S.T.Aé) apparently had early knowledge of the design and indicated to Breguet that, in their view, the aircraft should be powered by the 200-h.p. Hispano-Suiza engine. Breguet disagreed, being of the opinion that the Hispano-Suiza engine would not provide enough power for the performance he intended his new aircraft to attain. He insisted on the 12-cylinder Renault, then rated at 220-h.p., which he knew well, for it was the standard power unit of the

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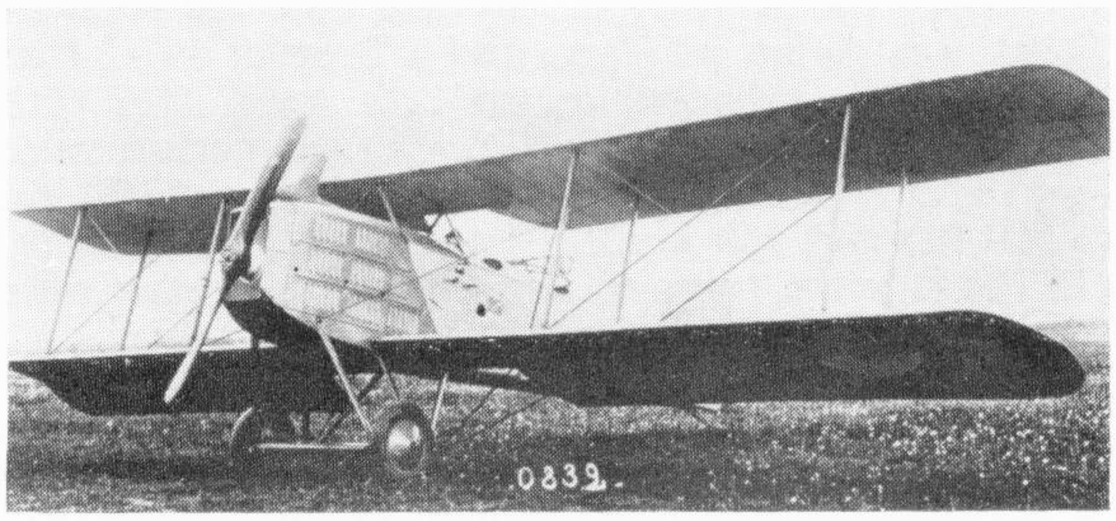
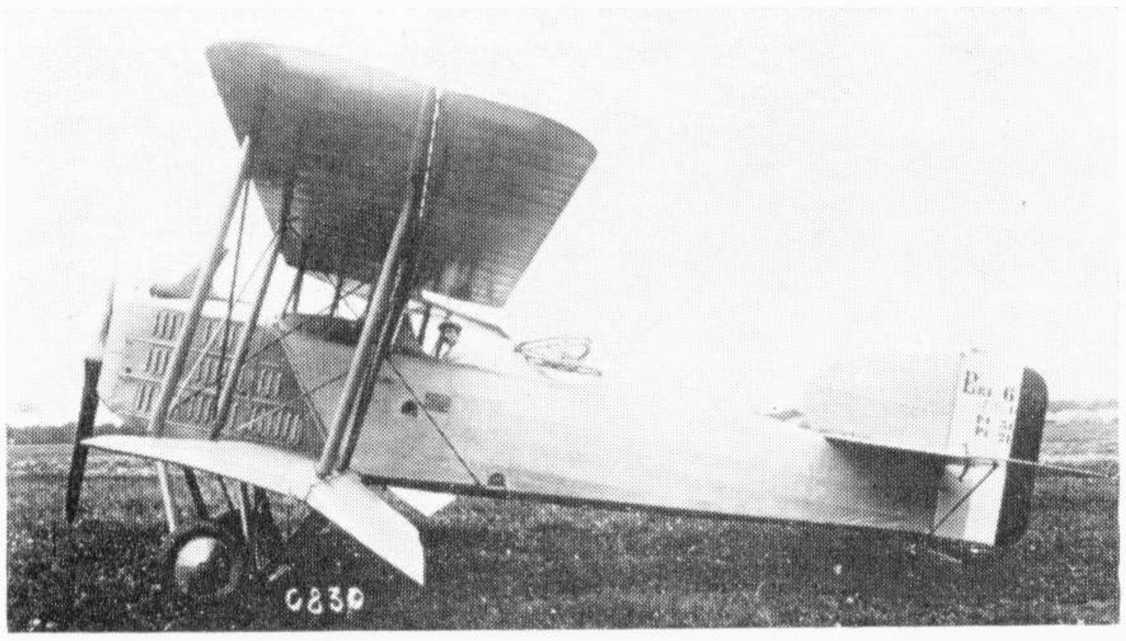


Two views of an early Breguet 14B2, No. 670. The three-quarter front view shows the greater length of the lower wing; both illustrations show the lower-wing flaps clearly. This aircraft had not been fitted with Michelin bomb racks and their characteristic forward projection of the lower-wing leading edges when this photograph was made; there were no windows in the fuselage sides at the observer's cockpit, and his gun ring was a T.O.4. No shutters were fitted to the radiator at this stage.
(Photos: Musée de l'Air 0832 and 0830)



Breguet Type V. It was an engine of considerable potential: by progressive development it was giving 275 h.p. by February 1917. A further increase in compression ratio from 4·25:1 in the basic 275-h.p. Renault 12Fc to 5:1 in the 12Fe raised the output to a maximum of 316 h.p. at full throttle. In various sub-types the Renault 12F engine came to be standardized for the Breguet XIV in its production forms.

Like its predecessors, the Breguet Type XIV was not a thing of beauty. Nevertheless it was an immensely practical aeroplane and what its appearance lacked in aesthetic appeal was balanced by sturdy purposefulness. The airframe was remarkable for the extensive use of duralumin in its structure. The fuselage longerons and spacers were of duralumin bolted together by welded-up steel-tube fittings and braced by piano wire; the engine bearers were of steel and duralumin tubing, and the stern-post was a length of steel tubing. The main spars of the wings were duralumin tubes of rectangular cross-section and had oak lining-pieces (ash on some production aircraft) at the attachment points of the interplane struts; those of the outer struts were further reinforced by sheet-steel sheaths round the spars. The wooden ribs had fretted plywood webs and ash flanges; the root ribs were box units composed of poplar flanges with two 3 mm. plywood webs; similar box ribs were fitted at the mid-bay points in each wing. The compression members were lengths of duralumin tubing. All surfaces of the tail unit were welded structures of steel tubing; the elevators had horn balances.

The main characteristics of the Breguet Type XIV were its rectangular frontal radiator, liberally-louvred cowling, the slight negative stagger and sweepback of its mainplanes, and its sturdy undercarriage. Ailerons were fitted only to the upper wing, which was made in two parts that met at a central cabane and alone had dihedral; the lower wing had none.

On 21st November 1916 the prototype Type XIV made its first flight at Villacoublay with Louis Breguet himself at the controls and Vullierme in the rear cockpit.

According to one source the prototype was fitted with flaps along the trailing edges of the lower wings; these were similar to the flaps that were later fitted to the early production Breguet 14B2 bombers. These flaps had a limited angle of depression and were not controlled by the pilot*. Twelve lengths of rubber bungee cord, the tension of each of which could be

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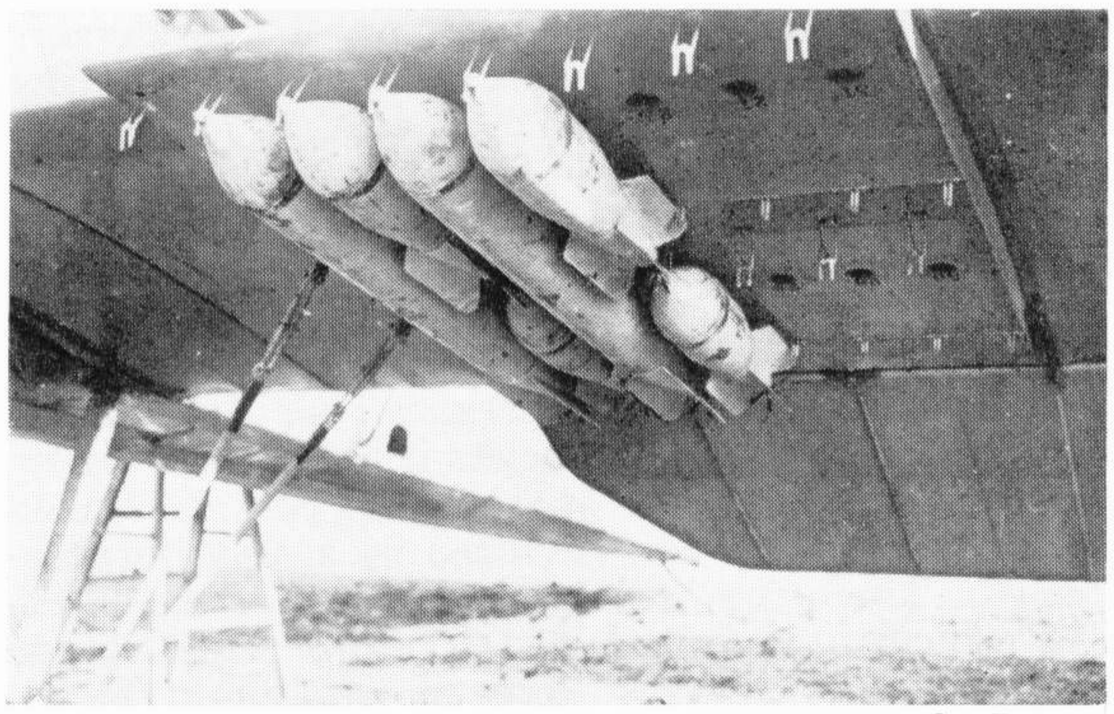
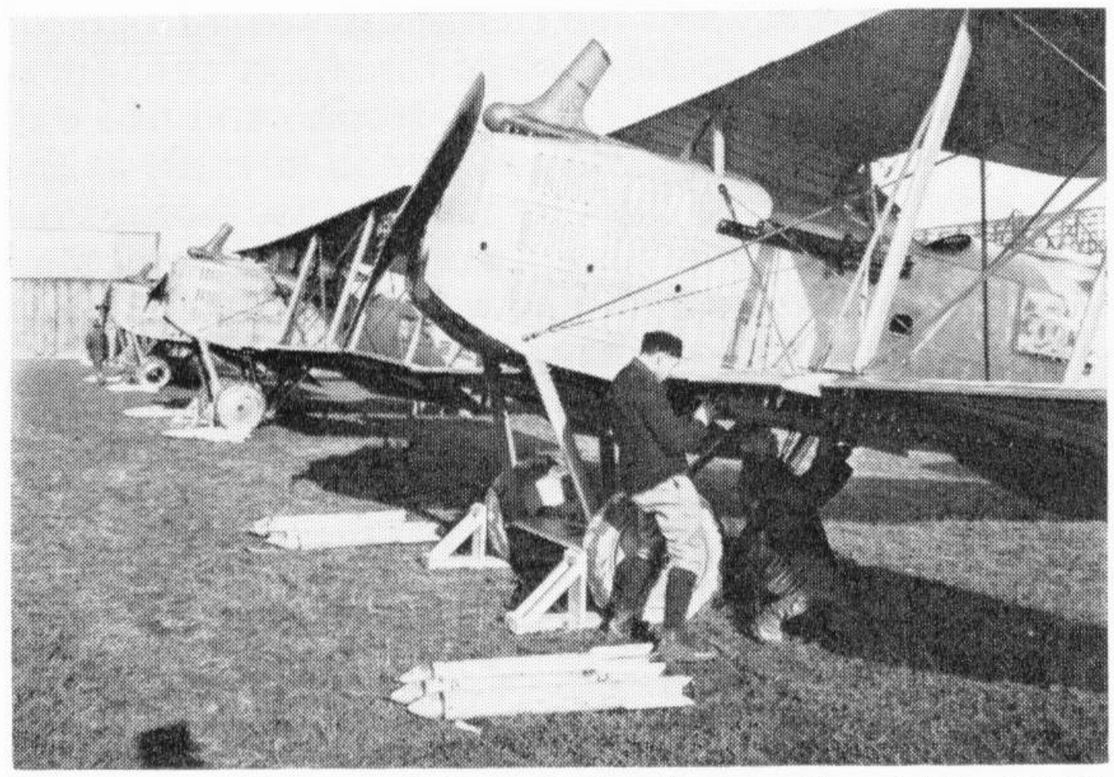
Breguet 14B2 No. 1102 with windows in fuselage sides at mid-depth. On the original photograph the forward projection of the lower wing at the Michelin bomb rack can just be distinguished. The original form of wings with straight trailing edges and lower-wing flaps are fitted, and the observer's gun mounting is a T.O.4.
(Photo: Musée de l'Air 13494)



The Michelin bomb rack under the port lower wing of a Breguet 14B2. (Photo: Musée de l'Air Moreau 1731)



Bombing up Breguet 14B2s of the famous Escadrille BR 66. On these aircraft the fuselage windows are immediately below the upper longeron (this became the standard position), and the gun mounting on the rear cockpit of the nearest aircraft is a T.O.3. (Photo: Musée de l'Air Moreau 1730)

individually adjusted, pulled the flaps into their lowered position as the aircraft's air speed dropped: at speeds above 70 m.p.h. the airstream sufficed to raise the flaps to form a natural continuation of the aerofoil section.

The prototype may well have had these spring-loaded flaps. Certainly there existed a Breguet 14 that bore no official serial number but had flaps and a much smaller fin than that of all production aircraft; this machine apparently had no underwing bomb racks, and it lacked the windows in the fuselage sides that characterized most Breguet 14B2s. The early Breguet 14 No. *670* had the standard production-type fin and lower-wing flaps but lacked the Michelin bomb racks and fuselage windows of the true production Breguet 14B2. The lower line of its rudder profile was also modified.

The performance of the prototype on its early flights confirmed Breguet in his belief that the Renault was the most suitable power unit for the aircraft, and on 30th November 1916 he wrote to the S.T.Aé.:

> "Exhaustive tests have proved, as we have always maintained, that we could not have obtained comparable results while meeting the same requirements if we had fitted the 200-h.p. Hispano-Suiza. We therefore feel more than ever confirmed in our opinion."

This seems to have disposed finally of any thought that the Breguet XIV should have the Hispano-Suiza engine.

On 11th January 1917 Breguet notified the S.T.Aé. that the aircraft had been brought to the point where it was in production form, and on the 24th he reported that further trials were in progress and were proving completely satisfactory. By 7th February the S.T.Aé. had a report indicating that the Breguet's speed at 2,000 m. (6,560 ft.) was 172 km./hr. (107·5 m.p.h.) with a Renault engine giving 275 h.p.

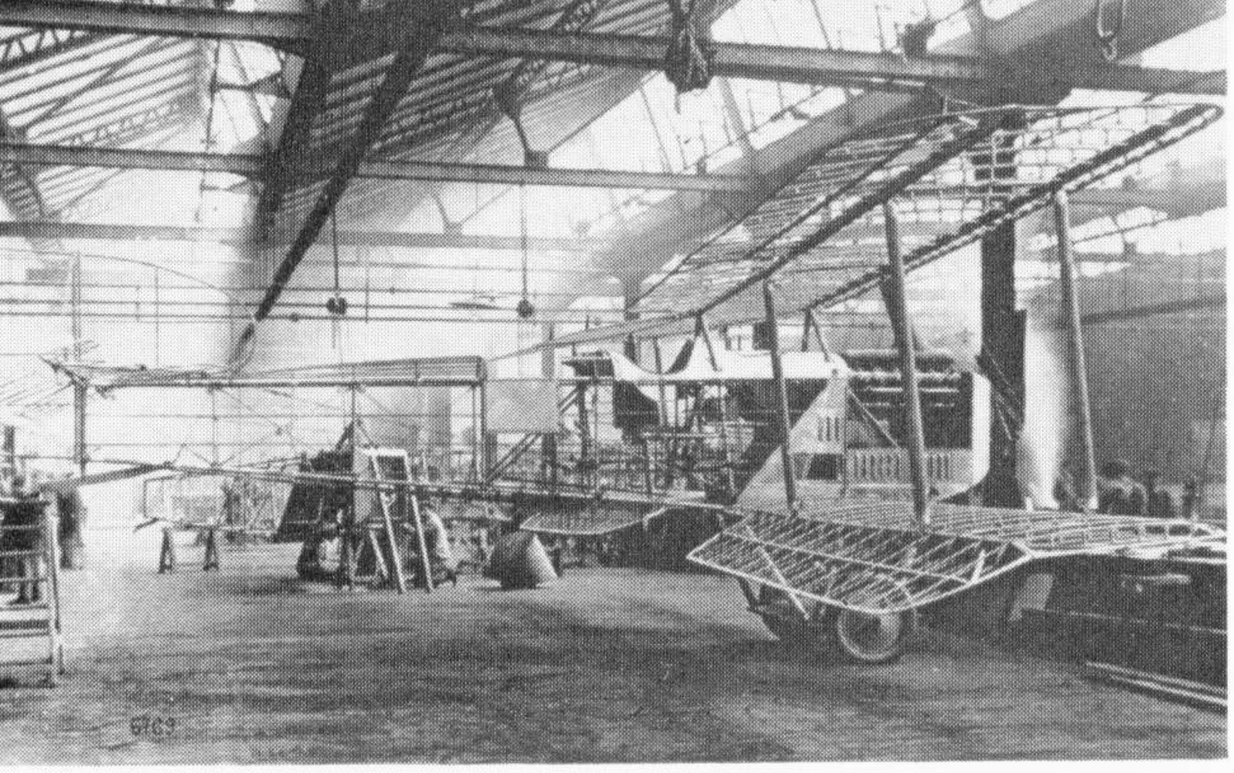
But French officialdom looked askance at the Breguet's structure, in which such extensive use was made of the then new metal, duralumin. It was in fact claimed to be the first aircraft in the world to combine an extensive use of duralumin with oxy-welded joints in the structure. Apart from its remarkable service history, the Type XIV is therefore of great significance in the history of aircraft structures.

On 22nd February Louis Breguet pressed for a production order for the Type XIV and followed this up on 2nd March by reporting to the *Service des Forces Armées* that he had prepared jigs and tooling for large-scale production of the aircraft.

Four days later, on 6th March 1917, he received the first official order for 150 Breguet 14A2s; this was followed on 4th April by a further contract for 100 aircraft of the same type. By this time the Renault 12Fcx was giving 300 h.p., and a Breguet 14A2 that was tested at Villacoublay on 12th April 1917 with a load of 526 kg. (1,157 lb.) returned performance figures of 176.5 km./hr. (110 m.p.h.) at 2,000 m. (6,560 ft.) and 169 km./hr. (106 m.p.h.) at 4,000 m. (13,120 ft.); the times to climb to these heights were 6 min. 50 sec. and 18 min. 30 sec. respectively.

That the authorities must have been convinced of the Breguet's qualities and potential is confirmed by the substantial expansion of production that followed in the spring and summer of 1917. On 25th April 1917 the Darracq company were requested to build 330; on 8th June fifty were ordered from the Société Henri et Maurice Farman; ten days later the Paul Schmitt company received a contract for 200. Further

A Breguet 14B2 fitted with Brandt et Fouilleret landing lamps on the lower wings. The aircraft has the original 14B2-type wings with flaps and straight trailing edges, and the observer's gun mounting is a T.O.3. Radiator shutters are fitted. (Photo: Jean Noël)



Breguet 14B2 under construction. In this skeleton view the flaps on the lower wings can be seen at maximum depression.
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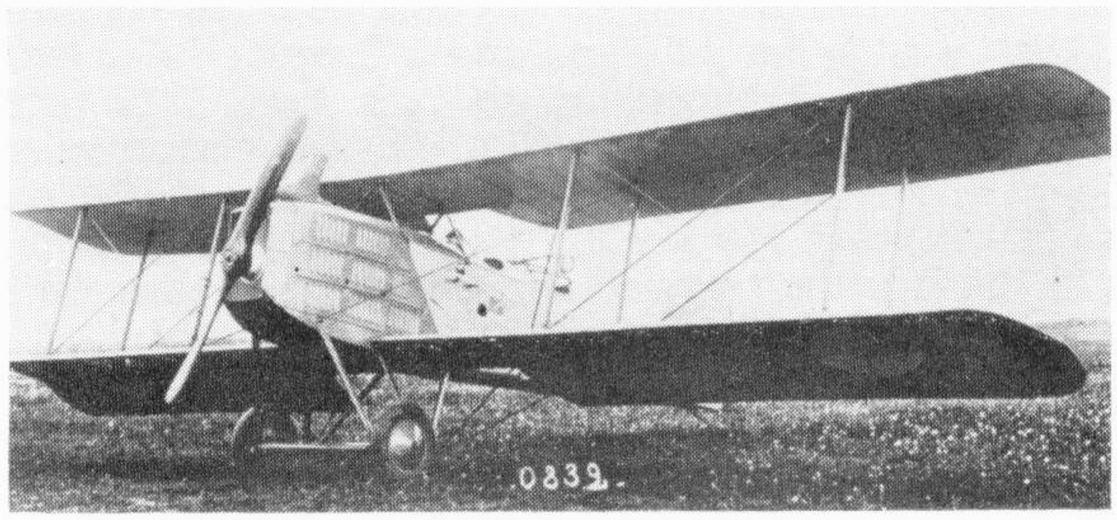

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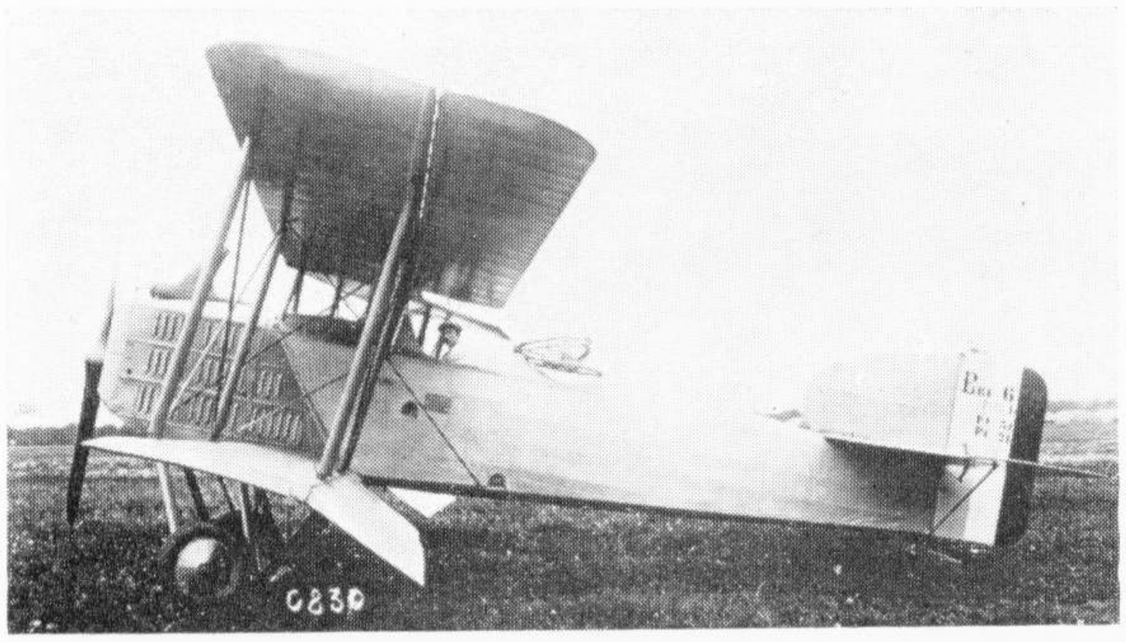

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(Photo: Musée de l'Air 13494)

contracts to the parent firm on 13th July and 11th September called for 250 and 125 aircraft respectively; and on the latter date Schmitt and Farman were asked respectively for 75 and 170 additional Breguets. On 9th December 1917 a further 600 were ordered, 300 from Bellanger and 300 from the S.I.D.A.M.

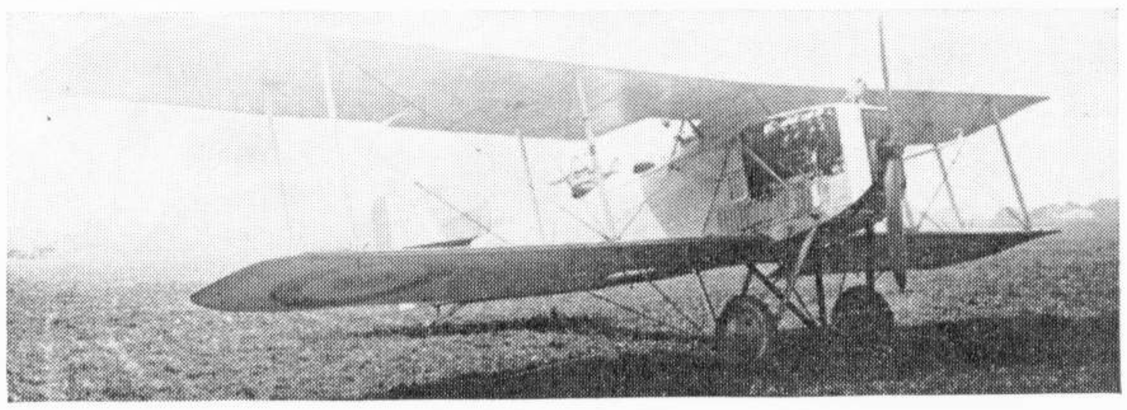
The type appeared in two main forms, the Breguet 14A2 and 14B2, respectively reconnaissance and bomber versions. As noted above, the 14A2 was the first production variant. It did not have flaps on the lower wings, and its equipment included a wireless transmitter, a camera and four 120 mm. bombs.

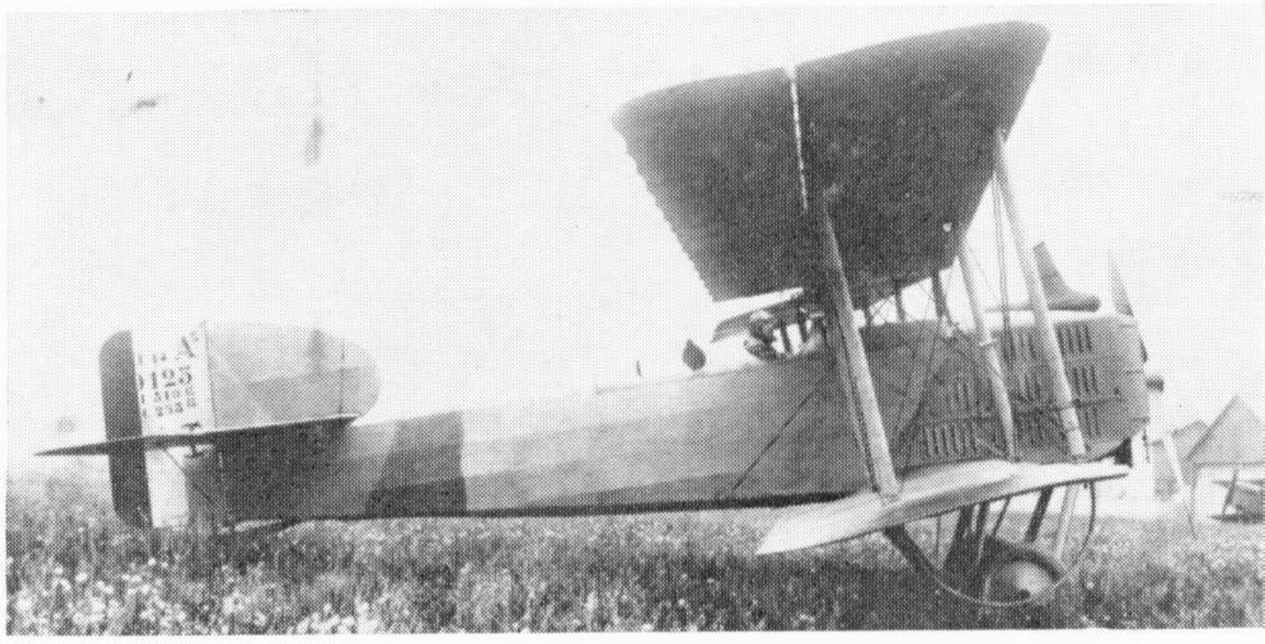
The prototype of the Breguet 14B2 was delivered to the S.T.Aé. on 12th April 1917. The early 14B2 differed from the 14A2 in having on the lower wing the bungee-sprung flaps already described; the span of the lower wing was greater than that of contemporary 14A2s and increased the total wing area by $4\frac{1}{2}$ sq. m. The bomb load was carried in Michelin racks on the underside of the lower wings; it could consist of up to 32 bombs of 115 mm. calibre or an equivalent weight of bombs of other sizes. A peculiarity of the early flap-fitted 14B2 was the small forward extension of the lower wing leading edge in line with the Michelin bomb racks: this was essential to prevent fouling of the flaps by the rear attachment points of the bomb racks. Transparent panels were let into the sides of the observer's cockpit, presumably to give adequate lighting for the bomb sight. (Bomb aiming and releasing were responsibilities of the observer; both he and the pilot had sliding trap-doors in the fuselage underside to give them a clear view of the ground.) On both the 14A2 and 14B2 dual control was provided for the observer: the control column in the rear cockpit was detachable.

Production aircraft of both variants became available in the summer of 1917 and began to replace the Sopwith $1\frac{1}{2}$ Strutters in French reconnaissance and bombing *escadrilles* and in the *Sections Artillerie Lourde* that spotted for the guns of the French heavy artillery batteries. By the end of 1917 Breguet 14s equipped the reconnaissance *Escadrilles* BR 11, 35 and 227, the *Sections Artillerie Lourde* BR 202, 209, 218 and 220, and the *Escadrilles de Bombardement* BR 66, 108, 111, 120, 126, and 127.

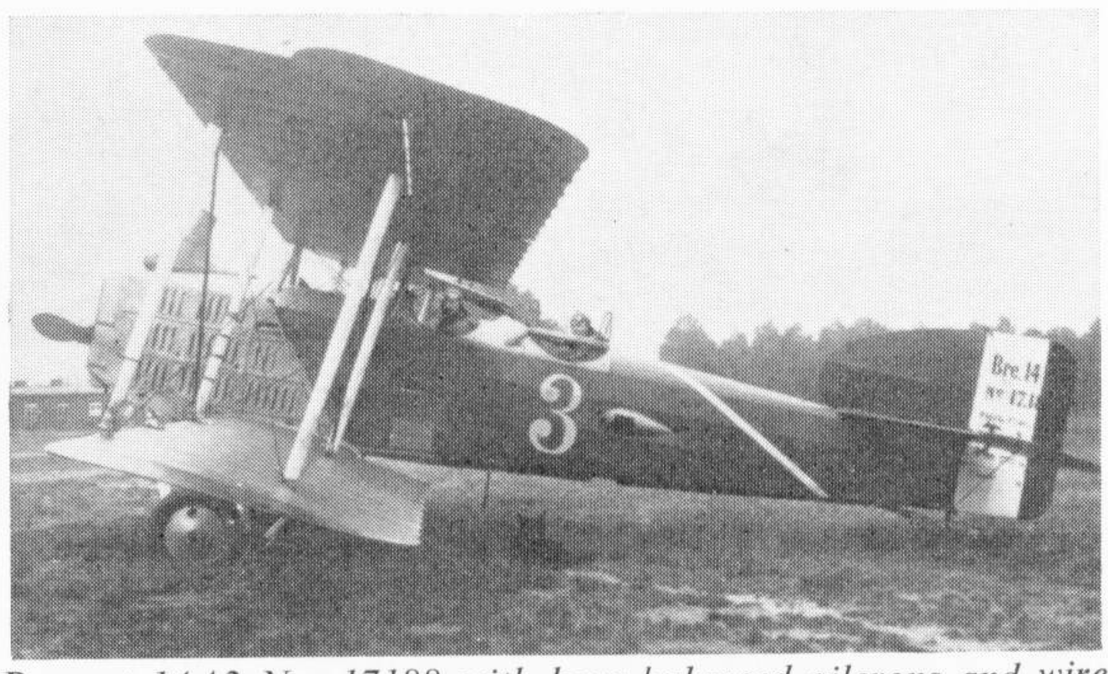
It appears that not all the contractors were able to start production immediately they received their contracts, however. Darracq, for instance, do not seem to have begun deliveries of Breguets until the spring of 1918; by the end of November that year they had delivered 442. A total of 700 Breguets were ordered from Darracq in 1918 and the firm's output was ultimately five aircraft per day. Production expanded further in 1918 and eventually the 14A2 and 14B2 equipped at least 71 *escadrilles* of the French *Aviation Militaire* on the Western Front, and were used at some time, and probably in varying quantities, by units in Serbia, Greece, Macedonia and Morocco.

No. 1021, a Breguet 14A2 fitted with the 275 h.p. Lorraine-Dietrich engine with frontal radiator.
(Photo: Musée de l'Air MA 1637)





A late-production Breguet 14A2 with wire trailing edges. The aircraft has obviously been converted for training or communication duties, as there is no gun mounting on the rear cockpit. It has an enlarged radiator projecting downwards below the bottom of the cowling, and there are skids under the lower wing tips. (Photo: Jean Noël)



Breguet 14A2 No. 17188 with horn-balanced ailerons and wire trailing edges. Equipped for photographic reconnaissance duties, this aircraft had windshields fitted on the decking between the cockpits.
(Photo: Etablissement cinématographique des Armées)

The Breguet 14 proved to be a redoubtable weapon in both forms, participating in many major actions with distinction. The *Section Artillerie Lourde* BR 224 earned a citation for its activities during the attacks on Mount Kemmel, and went on to render valuable service during the great Allied offensive, under the orders of the French X^{e} Armée. Capitaine Paul-Louis Weiller of BR 224 was selected to be the commandant of the *Groupe des Escadrilles de Grande Reconnaissance* from June 1918. On 9th July 1918, flying a Breguet, he shot down two enemy aircraft in the course of a single sortie.

The Breguet's sturdy airframe withstood well the rigours of operational flying and underwent surprisingly little modification, despite the enormously varied duties the aircraft were called upon to perform. The only major change was made to the mainplanes. To improve lateral control late-production aircraft were fitted with horn-balanced ailerons, and this modification was accompanied by changes in the lower wings of both the Breguet 14A2 and 14B2. The 14A2 was given lower wings of the span and plan-form of those fitted to the early (i.e., plain-aileron) 14B2 but without the rubber-sprung flap. On the balanced-aileron 14B2 the lower-wing flaps were abandoned: the lower mainplane was reduced in span and had revised, cut-back wing tips somewhat similar to those of the Armstrong Whitworth F.K.8. The removal of the flaps eliminated the need for the forward extensions of the lower wings at the bomb racks, and new racks of a later type were fitted.

A further minor modification that appeared on some Breguet 14s was the use of a wire trailing edge

Breguet 14A2 No. 2405 with Fiat A-12 engine and frontal radiator. The aircraft has the original 14A2 wings with straight trailing edges, and inter-cockpit windshields are fitted.
(Photo: Musée de l'Air 02343)

Fiat-powered Breguet 14A2 with enlarged radiator.
(Photo: Musée de l'Air 02745)

on the mainplanes. On these aircraft a light spar was fitted a few inches ahead of the wire. This feature appeared on 14A2s and 14B2s alike, with both types of aileron. The reason for the modification is obscure, and it may have been a characteristic of the products of one contractor.

As German opposition to air attacks became stronger and more effective, armoured seats were fitted to Breguet 14B2s and some had a second Lewis gun firing downwards and rearwards under the fuselage.

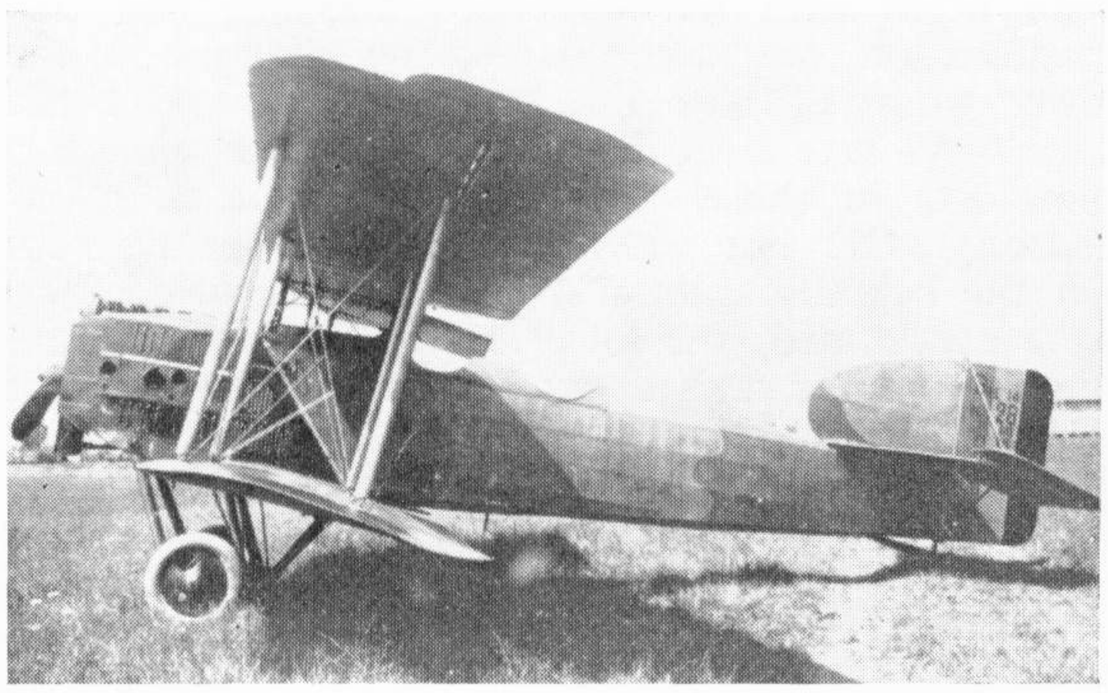
Although the 300 h.p. Renault, in one version or another, remained the standard power unit of both versions of the Breguet 14, other aero-engines were fitted either experimentally or in numbers. Doubtless this was done partly as an insurance against shortage of Renaults, partly because Renaults could not be spared for all the aircraft that Belgium and the U.S.A. might want, and also because the Breguet made an admirable flying test-bed for engines of greater power than those of the Renault 12F series.

By the summer of 1918 the basic Renault engine, with bore increased from 125 mm. to 128 mm. and stroke from 150 mm. to 160 mm., was delivering 350 h.p. at 1,600 r.p.m. and 390 h.p. at full throttle. This version was designated Renault 12Ff and was apparently fitted to some of the late-production Breguet 14s.

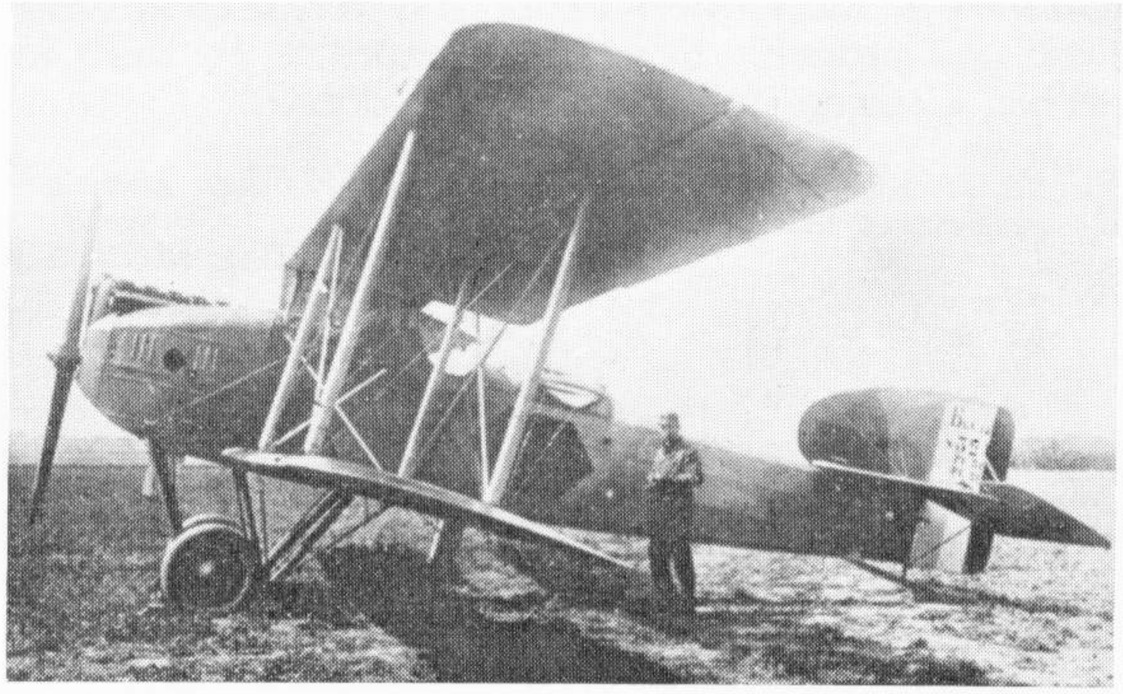
The spring of that year had also seen the emergence of the Renault 12K, in which the bore and stroke were 134 mm. and 180 mm. respectively. This engine was rated at 400 h.p. and, in its 12Kb form, was expected to give 454 h.p. at full throttle. A Breguet 14A2 was fitted with a Renault 12K and had been tested by May 1918. This engine gave the Breguet a fighter-like performance. And indeed in the autumn of 1918 a two-seat escort-fighter development of the Breguet 14 was built: this was the Breguet 17C2, powered by the Renault 12K, armed with twin Vickers guns for the pilot. The Breguet 17C2 arrived too late for wartime service, however.

An alternative engine that was installed, at first

Fiat-powered 14A2 with horn-balanced ailerons and straight trailing edges on mainplanes. The engine has the enlarged radiator and all armament has been removed.



The alternative Fiat installation, with underslung radiator and tapered cowling.
(Photo: Royal Aeronautical Society)



experimentally in the Breguet 14A2 No. *1021*, was the Lorraine-Dietrich 8Bd. This V-eight engine was one of the standard power units of the SPAD XVI-A2 and its output was normally quoted as 265 h.p. at 1,700 r.p.m., but the engine installed in the Breguet 14 was reported to give 285 h.p. at 1,700 r.p.m. Its lighter weight compensated for its lower power, and the performance of the Lorraine-Breguet 14 compared well with that of the Renault-powered aircraft. In No. *1021* the Lorraine engine had a rectangular frontal radiator that differed little from that used with the Renault, but a later installation had a blunt nose cowling and an underslung radiator: this version appeared on some Breguet 14TOEs after the war, and on some of the aircraft supplied to Spain.

The 12-cylinder Lorraine-Dietrich 12Da engine was also fitted to a Breguet 14; with it the aircraft had an excellent performance, as the table shows. Additionally an installation of the experimental Lorraine-Dietrich 12E engine was proposed. Of the same bore and stroke as the 12Da, the 12E had a slightly lower compression ratio and was expected to deliver 390 h.p.

At least some of the Breguets delivered to the Belgian *Aviation Militaire* and the U.S. Air Service had Fiat A-12 or A-12bis engines. The Fiat was a six-cylinder in-line engine, and there were two different installations: one retained the usual rectangular frontal radiator with shutters; the other had a tapered cowling and an underslung radiator. Both versions were used, some of the American Breguets being employed as trainers with the designation Breguet 14E2. The gun mounting was removed from the rear cockpit and conventional coamings fitted. Some Renault-powered Breguets were similarly modified for training purposes. American pilots were being trained on Breguet 14B2s as early as December 1917, and 14E2s were in use by February 1918. Their training was given at the 7th American Instruction Center, Clermont-Ferrand.

Two variants of the Panhard 12 engine were experimentally flown in Breguet aircraft, as was a specimen of the big Fiat A-14 twelve-cylinder engine, nominally rated at 600 h.p.

On 20th September 1918, the Breguet 14B2 No. *4360* was tested at Villacoublay with a Liberty 12 engine, No. 17657. The recorded performance was surprisingly little better than that of the standard Renault-powered 14B2 but was obtained at a greater loaded weight. In the lighter Breguet 14A2 the Liberty enhanced the performance considerably. It seems that it was hoped to use the Liberty-powered 14A2 as an escort fighter with the designation Breguet 14AP2, but this variant never entered French service, possibly because the Breguet 17C2 was in prospect, but more probably for sheer lack of Liberty engines.

The big, sturdy Breguet airframe was well suited to

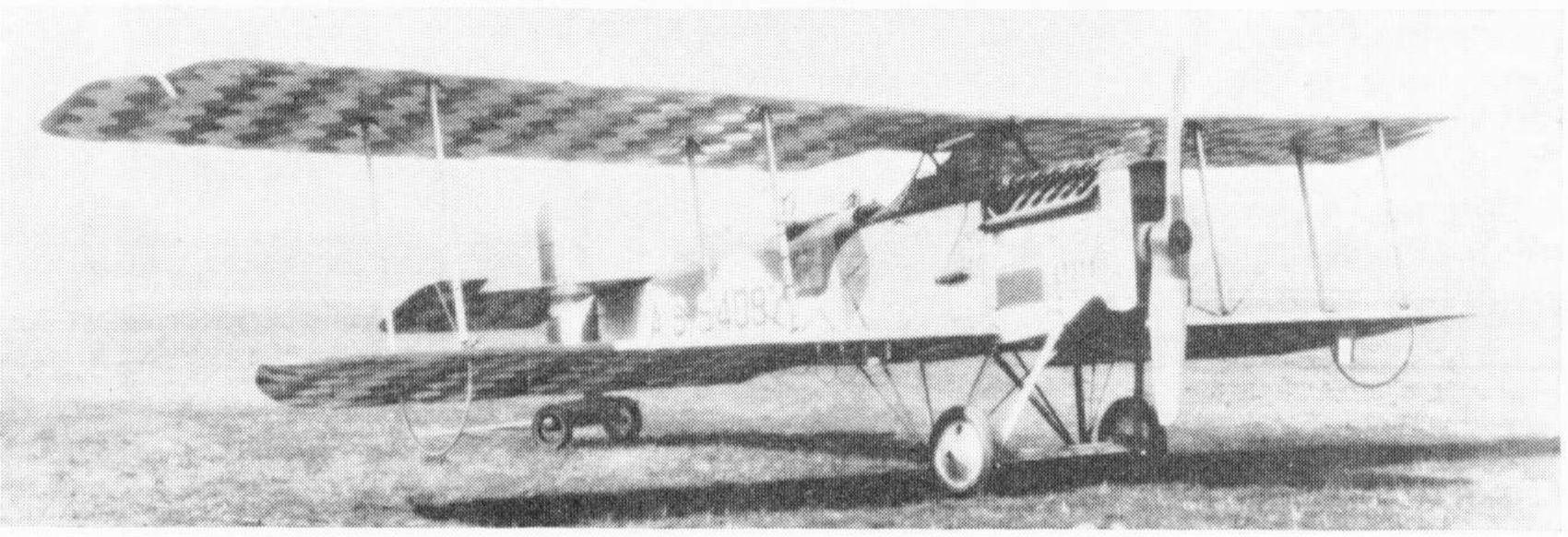
Breguet 14B2 No. 4360 with Liberty 12 engine. This aircraft is remarkable for having the projecting wing portions on the lower wings combined with the late 14B2 wing structure, in which there were no flaps on the lower wings. The revised plan-form of the lower wing tips can be seen and should be compared with that of No. 670 on page 5. As explained in the text, this revised wing arrangement was fitted to Breguet 14B2s that had the horn-balanced ailerons; this aircraft also has wire trailing edges. (Photo: Jean Noël)

the Liberty engine, and it is likely that American units might have been equipped with Liberty-powered Breguet 14s if the war had lasted longer. At McCook Field, with the Project No. P-148 and the U.S. Air Service serial number A.S.94097, a Liberty-powered Breguet 14B2 was tested. This Breguet was still in existence in June 1924.

Of all the experimental power-unit installations made in Breguet 14 aircraft none was more important than that of the special 320 h.p. Renault 12Fe that was fitted with the Rateau turbo-supercharger. Auguste Rateau, the designer of a steam turbine that was then widely used, was the first man to apply turbo-supercharging to aero-engines;* he made his first installation in 1916. (Coincidentally, J. E. Ellor of the Royal Aircraft Factory, Farnborough, was working on supercharger design at about the same time, and had already turned from his original centrifugal geared blower to the design of a turbo-compressor when, learning of Rateau's work, he obtained from France a Rateau unit for practical experiments on the R.A.F.4d engine.) In 1918 a Breguet 14 was fitted with a Rateau turbo-supercharger, and a spectacular improvement in performance was obtained.

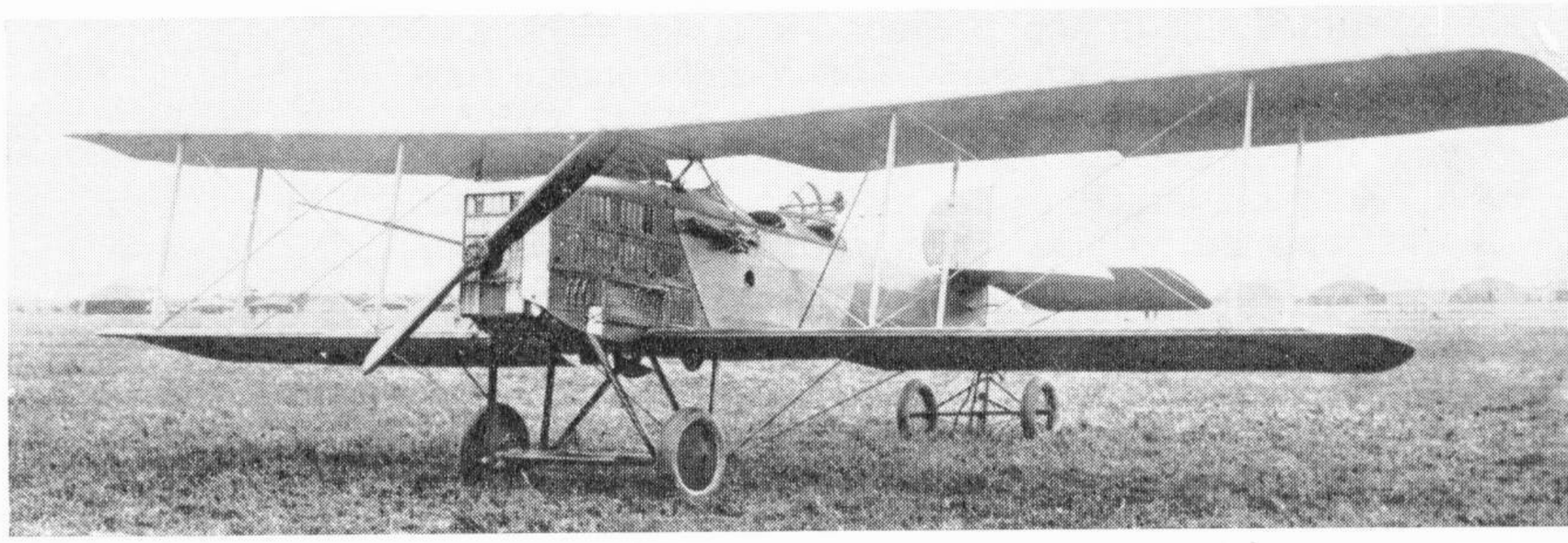
Supercharged Breguet 14s did not see operational service during the war, but development of the Rateau device proceeded after the Armistice. On 2nd March 1923 Lt. Benoît flew a Rateau-equipped Breguet 14 with a load of 500 kg. (1,100 lb.) to a height of 5,600 m. (over 18,350 ft.). This was a world record, but stood for only ten days before being surpassed by the new Breguet 19. In 1924 the 34eme *Régiment d'Aviation* at le Bourget received sixteen Rateau-fitted Breguet 14A2s.

In the field, the operational Breguets underwent the usual kind of minor modifications. On some aircraft the pilot's armament consisted of a Lewis gun mounted centrally above the upper wing. Night-flying Breguet 14B2s were fitted with streamlined

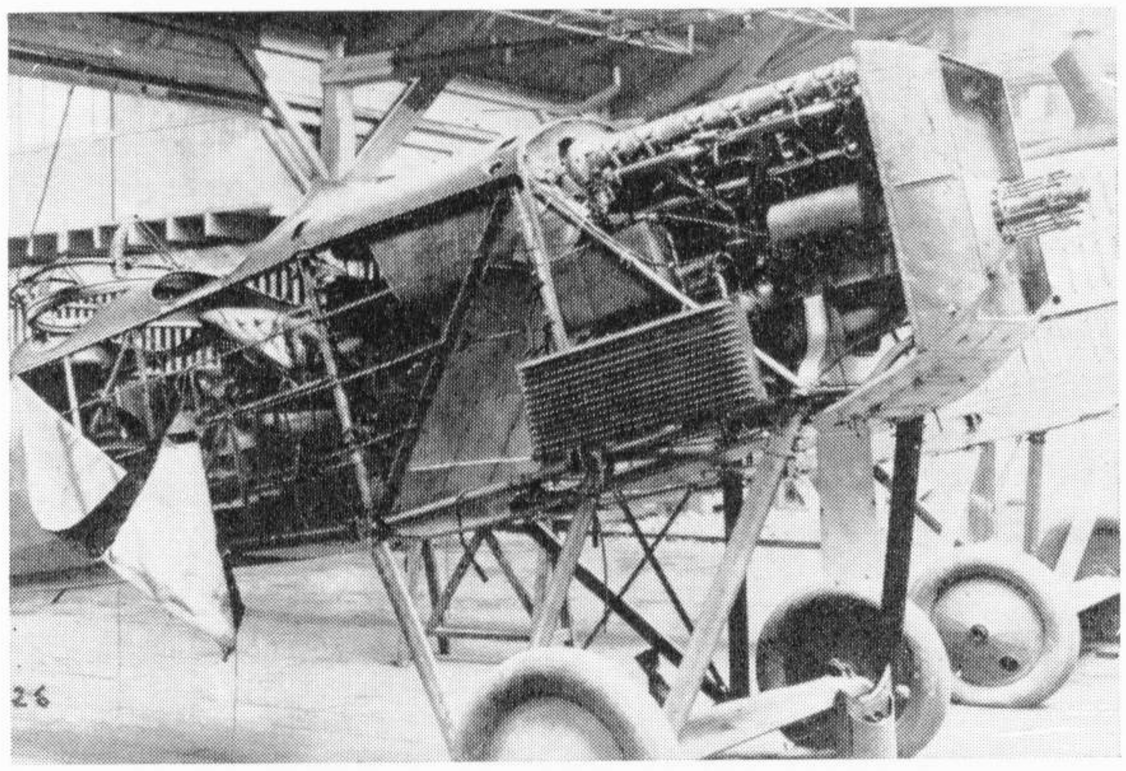


A different Liberty installation in a Breguet 14B2 at McCook Field, U.S.A. This aircraft had the revised 14B2 wing structure with horn-balanced ailerons, together with the later bomb racks that required no forward extensions of the lower-wing leading edges. It bore the U.S. Air Service number A.S.94097 and the McCook Field Project No. P-148.

Right: *Renault-powered Breguet 14A2 fitted with Rateau turbo-supercharger, distinguished by the absence of the usual exhaust stack and the addition of the air intakes on the cowling sides.*
(Photo: Musée de l'Air 02684)



Below: *Details of the Rateau installation in a Breguet 14.*
(Photo: Musée de l'Air 02326)



Later Rateau installation on a Breguet 14B2 that has the revised wing structure with horn-balanced ailerons and flapless lower wings of modified planform. The late-type bomb-racks are fitted, and the aircraft has under-wing skids and wire trailing edges.

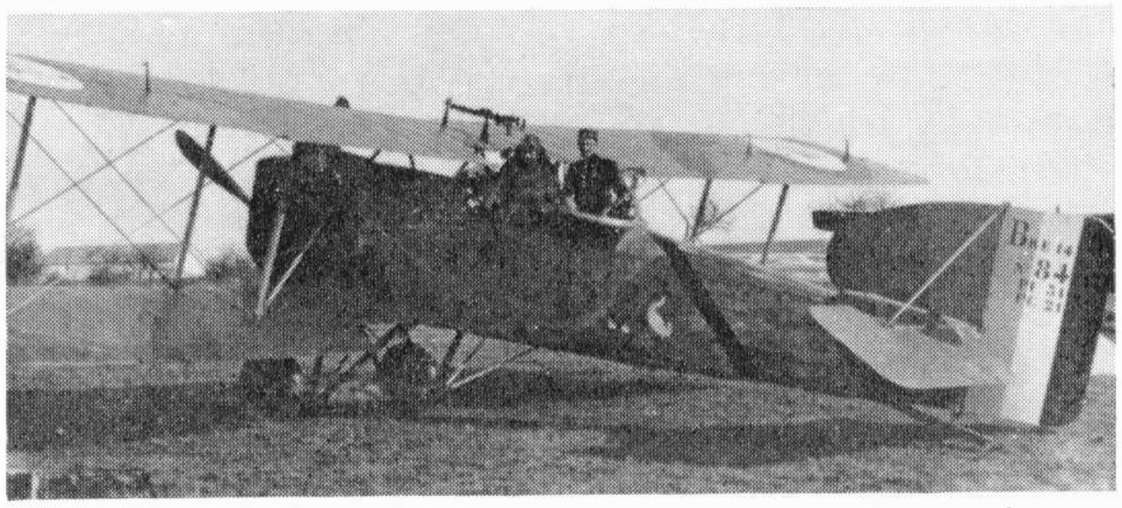
landing lamps on the lower wings; these were of either the Brandt et Fouilleret or Vérain types. Some of the aircraft flown by the U.S.A.S. 9th Aero Squadron had multiple flare brackets under each wing tip. For night bombing an enlarged three-bay development of the Breguet 14B2 was built as the Breguet 16 Bn 2 and went into production.

A single-seat bomber version of the Breguet 14 design was evolved in 1918. The space normally occupied by the pilot's cockpit was filled with additional fuel tanks that increased the aircraft's endurance to six hours, and the pilot sat in what was the observer's cockpit of the standard two-seater. It has been reported that it was hoped to use this version, which was designated Breguet 14B1, to bomb Berlin, but its endurance was never put to that particular test. Apparently several Breguet 14B1s were built, and one or two may have gone to operational units. Some had the lower-wing flaps; others, such as No. *2198*, had the standard Breguet 14A2 short lower wing without flaps.

A more remarkable version of the Breguet 14 came into existence as a result of the strenuous efforts made by Major Chassaing of the French military medical service for the speedy removal of seriously wounded men from the fighting areas to places where adequate surgical and medical aid would be available. He first used an aeroplane for this purpose in 1917 in the Moulin-de-Laffaux area. With its capacious fuselage the Breguet 14 was well suited to work of this kind, and in 1918 four Breguet 14 ambulance conversions were used on the Aisne front. Each aircraft was capable of carrying two stretcher cases. More Breguet 14 ambulances, designated Breguet 14S (the suffix signified *sanitaire*), were built and saw service in the post-war years in the French operations against the Riffs in Morocco and in Syria in 1925-26. In the Moroccan operations over 500 casualties were evacuated by the Breguet 14 ambulances; in Syria 200 were similarly air-lifted between June 1925 and July 1926. One of these aircraft was reported to be with the *Escadrille indo-chinoise No. 2* at Bien Hoa in 1925.

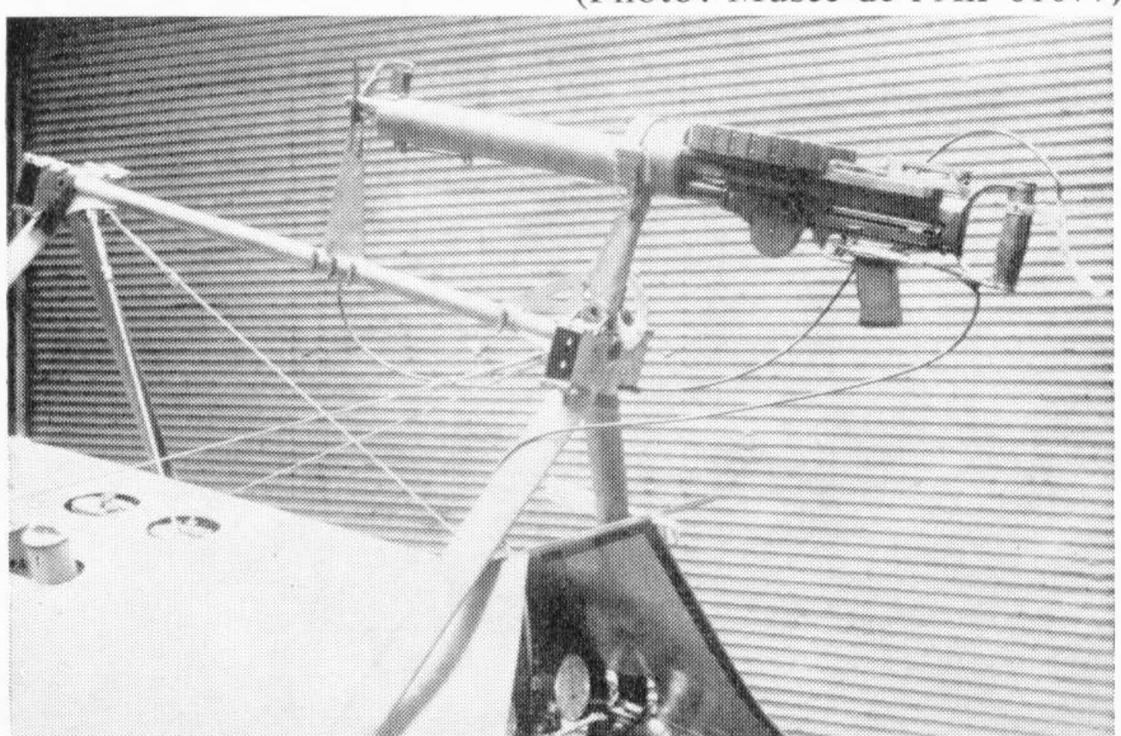
The early ambulance Breguet accommodated its casualties in the rear fuselage, but the later conversions had the pilot well aft. These were adaptations of the post-war Breguet 14T and 14T*bis* described below, in which the pilot's cockpit was behind a cabin in which the stretcher cases were carried.

In 1918 the 2me and 3me *Escadrilles* of the Belgian *Aviation Militaire* were re-equipped with Breguet 14A2s powered by the Fiat A-12 or A-12bis engine.



Breguet 14A2 of Section Artillerie Lourde *BR 220 with overwing Lewis gun for the pilot. This aircraft is illustrated in colour on page 15.*
(Photo: Etablissement cinématographique des Armées)

Installation of a Lewis gun above the cabane of a Breguet 14.
(Photo: Musée de l'Air 01077)



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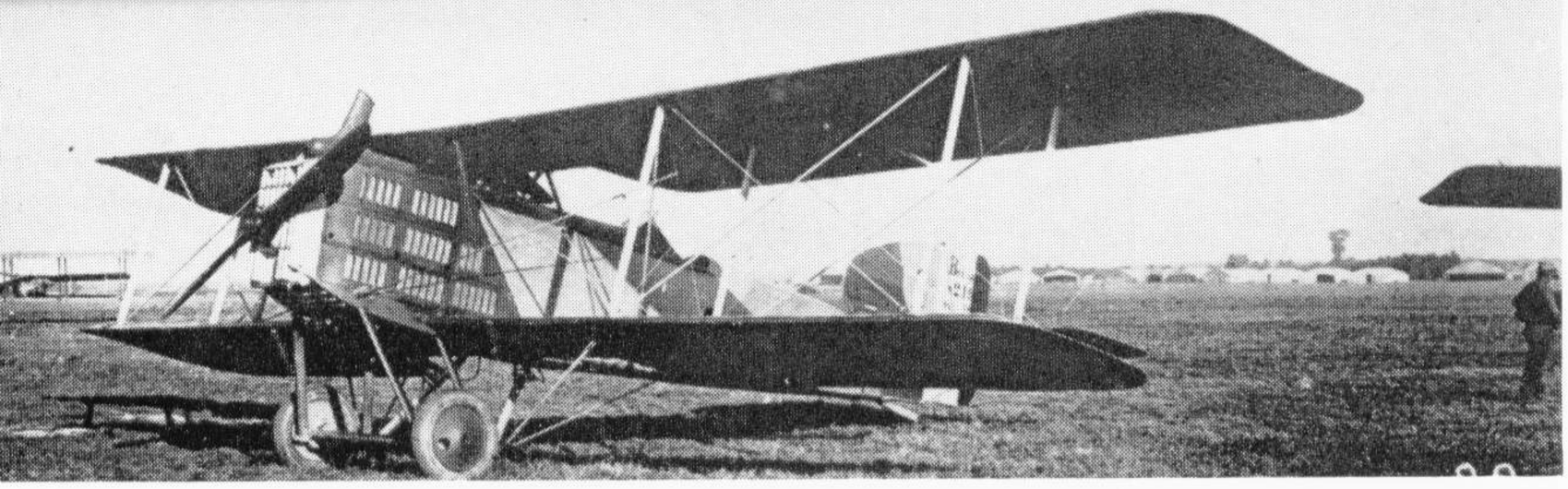
* *The first known proposal for the use of a turbo-supercharger on an internal-combustion engine was made in 1906 by the Swiss engineer Alfred Buechi of the Brown-Boveri company; the first tests were made in 1911.*



Breguet 14B1 No. 2196. This aircraft has the standard Breguet 14A2 wing arrangement, despite its bombing function. Other Breguet 14B1s had 14B2-type wings.

(Photo: Musée de l'Air MA 1624)

Of the 376 Breguet 14s purchased by the American Expeditionary Force in 1918, just over half were Fiat-powered: 100 were trainers of the Breguet 14E2 type mentioned above. The other U.S.A.S. aircraft consisted of 229 Breguet 14A2s, of which 90 had Fiat engines, and forty-seven 14B2s. The Breguets were issued to a number of American units, but their main operational service was with the 96th and 9th Aero Squadrons. The 96th was the first American bombing unit to become operational in June 1918, and the 9th was a night-reconnaissance squadron.

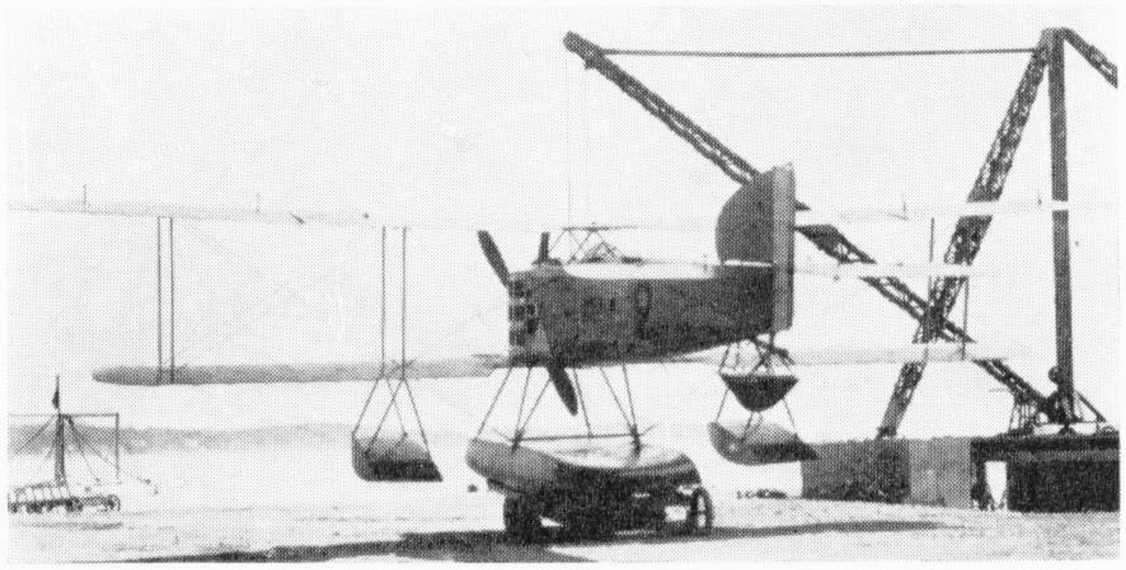
Until the Armistice the Breguet 14 gave yeoman service in the reconnaissance and bombing rôles. All told, the Breguet day-bomber squadrons dropped a total weight of bombs of 1,887,600 kg. (about 1,854 tons) during the war.

A Breguet 14A2 participated in one of the last acts of the 1914-18 war. In November 1918, when the German Major von Geyer went from Tergnier to Spa bearing the armistice conditions, he was flown in a Breguet 14A2 piloted by Lt. Minier. The aircraft had large white flags attached to the outer rear interplane struts.

Although the Breguet 14 was so widely and successfully used by the French military *escadrilles* it did not find favour with French naval flying units. A float-plane version was built with the designation Breguet 14H. References to this variant are confusing: one source states that the 14H was a conversion of the 14B2, whereas the aircraft with centre-float undercarriage illustrated here was a converted 14A2. Two Breguet seaplanes with the centre-float undercarriage were with the *Escadrille indo-chinoise No. 2* at Bien Hoa in 1925.

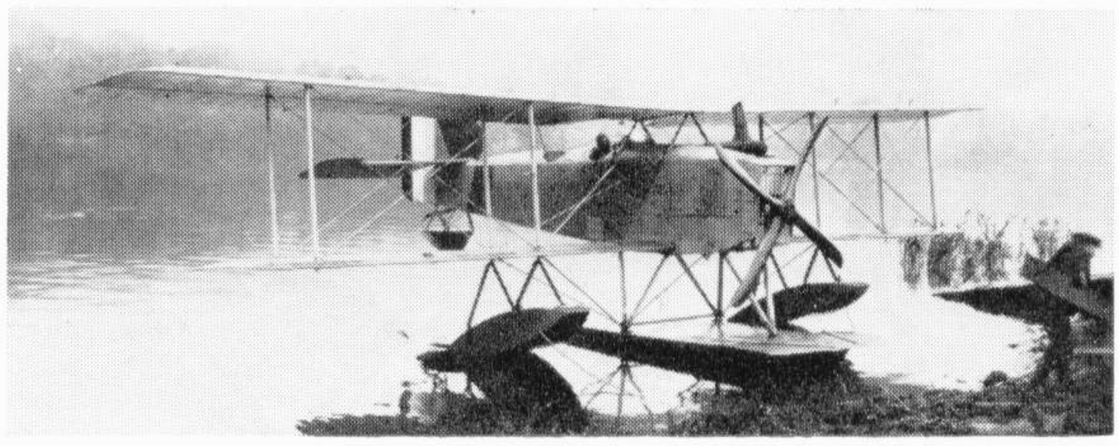
A twin-float version was tested in February 1924 at the Centre d'Aviation de Saint Raphael. The floats were made by the Blanchard company, and the assembly was designed to be attached to the normal undercarriage structure with additional struts to the fuselage. The Blanchard float conversion was tested on a French naval Breguet 14B2, but it seems that the idea was not developed.

With a view to using Breguet 14 landplanes for oversea patrols, experiments with flotation gear were conducted. This consisted of two large air bags mounted under the lower wings. The bags projected well forward, and their spines were braced by oblique struts from the tops of the forward interplane struts. A hydrovane was fitted ahead of the undercarriage, and the wheels were probably jettisonable. It is difficult to understand why such a clumsy installation was made, because a French Voisin 10, Caudron G.IV and Hanriot HD-3C2 had all been fitted with various versions of the well-tried and much neater Grain flotation gear developed by the R.N.A.S., and all three French types had been tested at the Isle of Grain during the war. Nevertheless, the



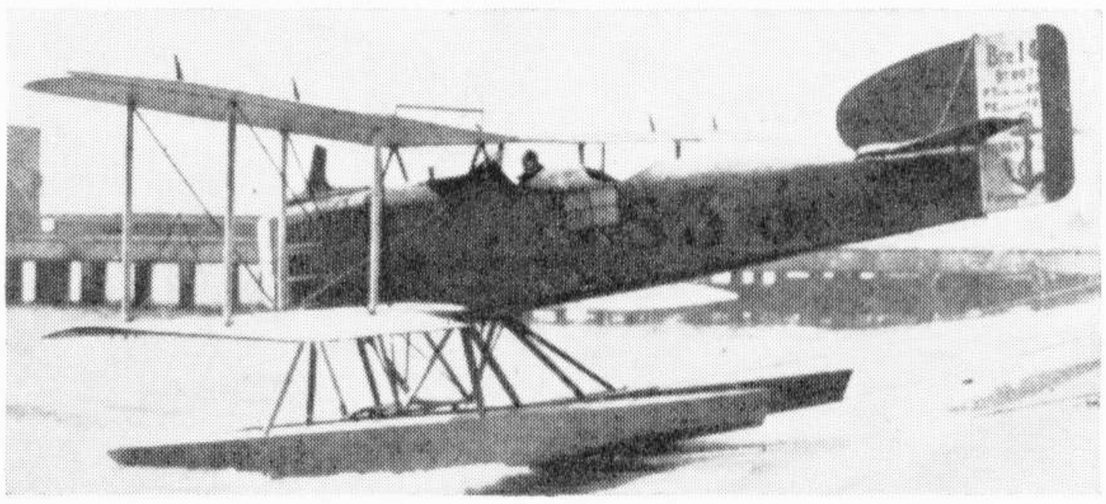
Breguet 14H. The aircraft has horn-balanced ailerons and wire trailing edges on the mainplanes; the lower wing appears to be that of a 14A2, yet the fuselage has the side windows of a 14B2.
(Photo: Musée de l'Air MA1633)

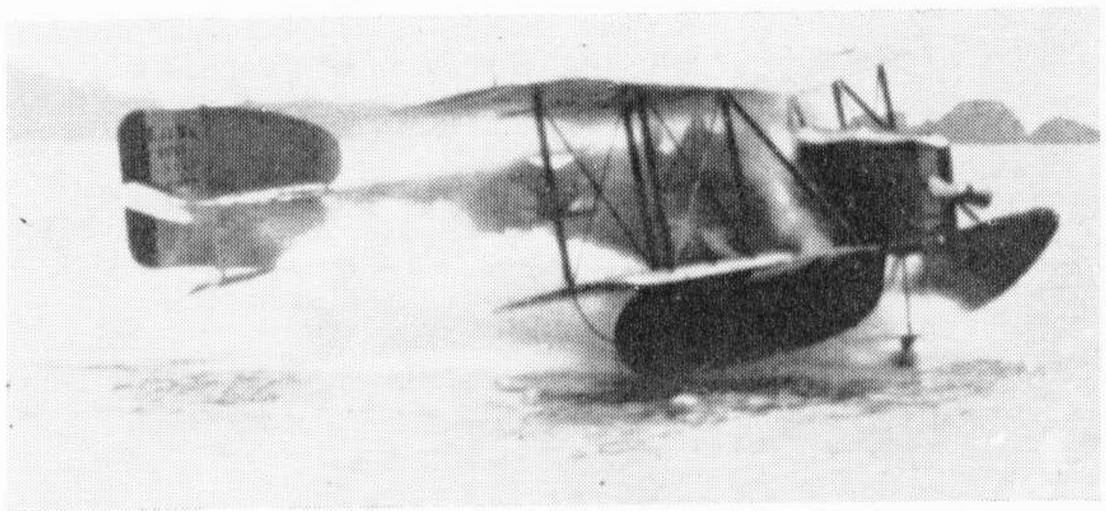
The Breguet 14A2 in which Major von Geyer was flown from Tergnier to Spa on 11th November, bearing the conditions of Armistice. (Photo: Imperial War Museum Q54996)

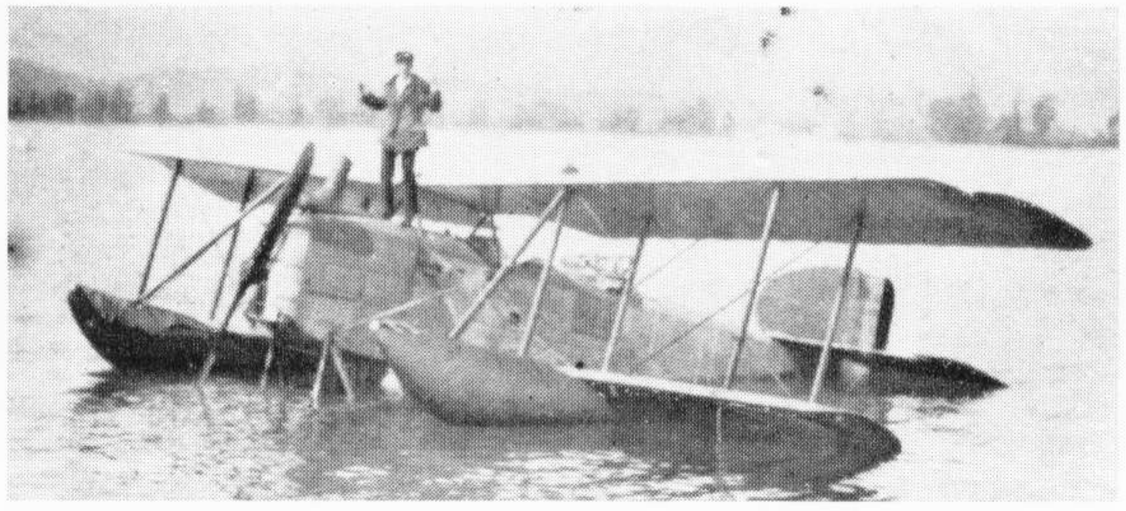


Apparently a later version of the floatplane Breguet 14. On this aircraft the front attachment of the main float is by a V-strut and the float itself is slightly modified; the outboard floats have a much greater angle of incidence; the aircraft has a four-blade airscrew, plain ailerons and straight trailing edges. The designation Breguet 14 Col. Hy. has been applied to this particular variant, suggesting that it was the version used by French colonial aviation units. (Photo: Musée de l'Air 14134)

The Bernard float conversion of a Breguet 14B2 of 1924. The twin-float undercarriage could be attached to the normal undercarriage struts of the basic landplane.







Breguet 14B2 fitted with flotation gear. The aircraft has horn-balanced ailerons, wire trailing edges, the late 14B2 lower wing and underwing skids. (Photos: Jean Noël)

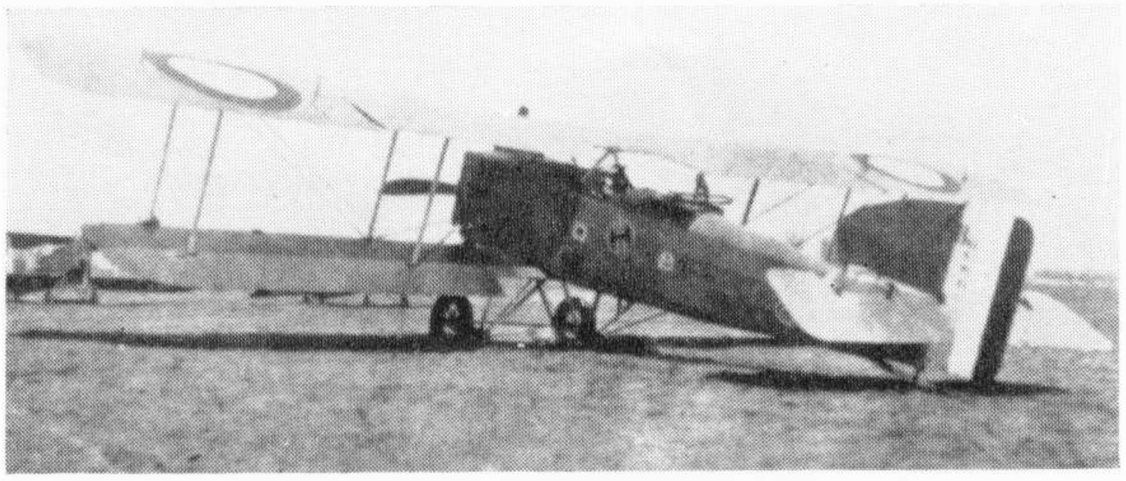
flotation gear fitted to the Breguet 14 worked, but it is doubtful whether it proceeded beyond the experimental stage.

When the war ended, production of the Breguet 14 did not stop. In fact it continued until 1926, by which time some 8,000 had been built, a total that was exceeded by few of the Breguet's contemporaries. The Breguet remained in service with many units of the *Armée de l'Air* in the post-war years, and saw extensive use in the French colonies. The version used in the colonies was designated Breguet 14TOE (*Théatre des Operations Extérieures*), and it has been reported that some were built at the French military workshops at Hanoi and Saigon. It is not known whether these aircraft were wholly built in Indo-China or merely —as seems more probable—assembled from spares.

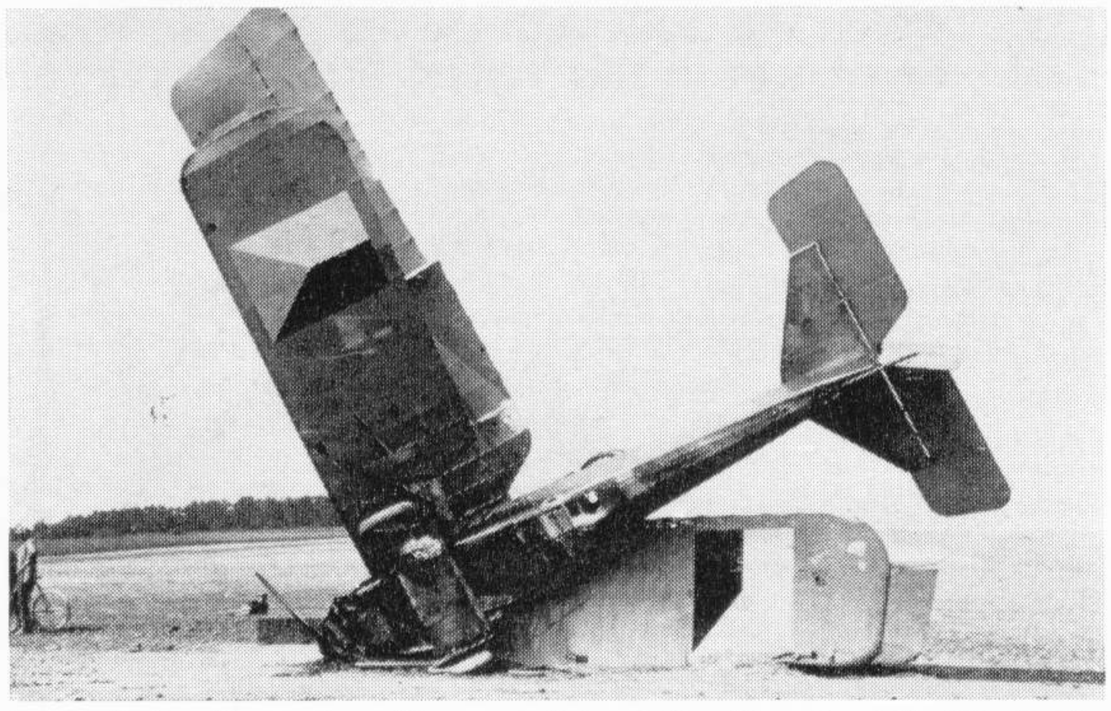
Many other countries had at least some Breguet 14s in their early post-war equipment. Brazil, China, Czechoslovakia, Denmark, Finland, Greece, Japan, Poland, Portugal, Siam and Spain all used the type in varying numbers, and the Breguet continued to fight in the troubled areas of the world. It was used in the many internal wars in China in the inter-war years; seventy aircraft designated Breguet 14/400 and powered by the 400 h.p. Lorraine-Dietrich 12Da, were supplied to China and Manchuria in 1923.

It has been said that the Breguet 14 was built in Spain under licence, production allegedly starting in 1920 in Madrid. It seems much more probable that this is a confusion with the licence-production of the later Breguet 19 in 1923 by the then newly formed C.A.S.A. of Madrid. War-surplus Breguets 14s sufficed to meet Spain's early needs. Four Spanish squadrons were equipped with the type in Morocco in 1922, and early in 1923 the Spanish Ministry of War purchased a further forty Breguets, together with 40 D.H.9s, twenty Nieuport 29s and twenty unspecified Fokker fighters.

Japan's first Breguet was a 14B2, No. *13003*, with a Liberty engine, bought by the Japanese army in 1919. It was used for training purposes, with French instructors, at Hamamatsu. The Nakajima company acquired a licence for the production of the Breguet 14 and, under the designation Nakajima B.6, built an aircraft with the external appearance of the Breguet 14B2. Its engine was a 360 h.p. Rolls-Royce Eagle VIII, which had a rectangular nose radiator with vertical shutters.

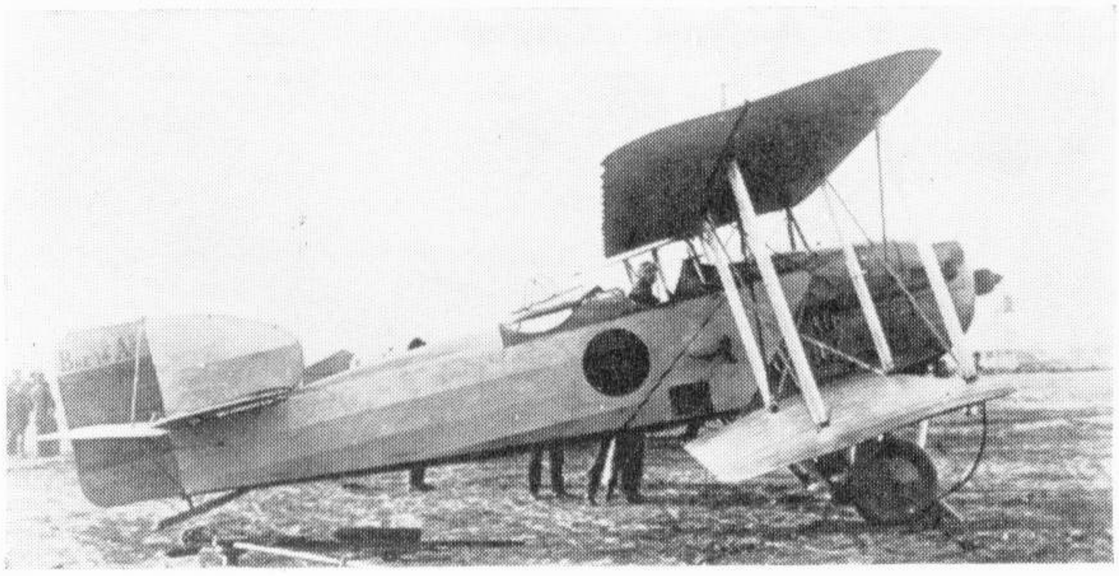


Breguet 14A2 No. 16723 in post-war service (about 1920-21) with the 33e Regiment aérien d'observation. The double-headed battleaxe emblazoned in red on the fuselage side indicates that the aircraft belonged to the 15e Escadrille of the 5e Groupe Observation, the unit that inherited the traditions and insignia of the wartime Escadrille SAL 33. (Photo: Jean Noël)

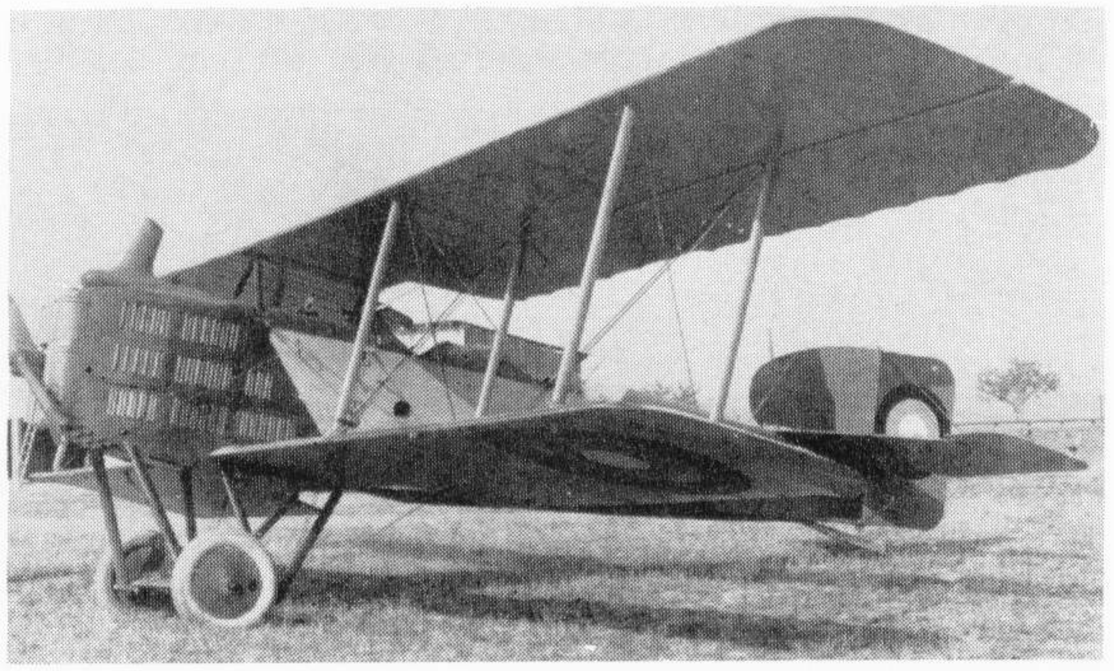


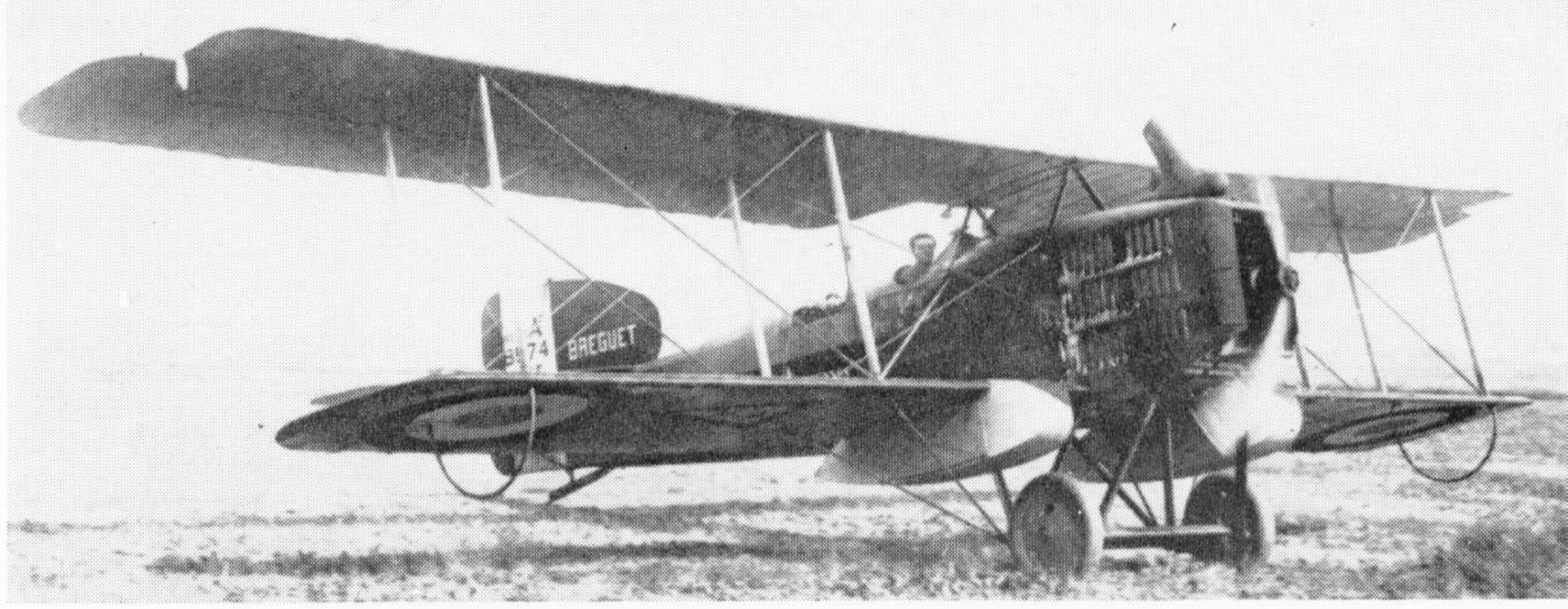
A crash landing of a Breguet 14 of the Czech A.F. (2nd Air Regiment in Olomouc). Note the flag-marking, which was introduced in late 1920.

A Breguet 14A2 with 275 h.p. Lorraine-Dietrich engine and underslung radiator, in Spanish markings. The plain ailerons, wire trailing edges and underwing skids can be seen in this photograph. (Photo: Musée de l'Air MA 1636)



Breguet 14 of the Czech A.F. in 1920 markings. This photo was taken on the airfield at Olomouc. (2nd Air Regiment).





A Breguet conversion of a 14A2 for air-mail transport. The aircraft is No. 8974, its load being carried in the containers under the lower wings.

(Photo: Jean Noël)

Apart from its long and distinguished military service, the Breguet 14 was used in large numbers as a commercial transport aircraft in the post-war years. Within weeks of the Armistice the Breguet was demonstrating its capabilities and reliability in a series of spectacular long-distance flights. On 26th January 1919 Lt. Roget and Capitaine Coli made the double crossing of the Mediterranean, a total distance of 1,600 km. (1,000 miles). On 5th April 1919, Roget flew from Lyon to Rome, then back to Nice. Accompanied again by Coli, Roget established a new French long-distance record by flying from Paris to Kenitra in Morocco, 1,900 km. (about 1,290 miles) in 11 hr. 15 min. All these and other great flights were made on Breguet 14s.

Following experimental air-mail flights between Paris and Strasbourg after the Armistice, Louis Breguet founded a new company, *La Compagnie des Messageries Aériennes*. Its original services linked Paris with Lille, Brussels, London and Marseille.

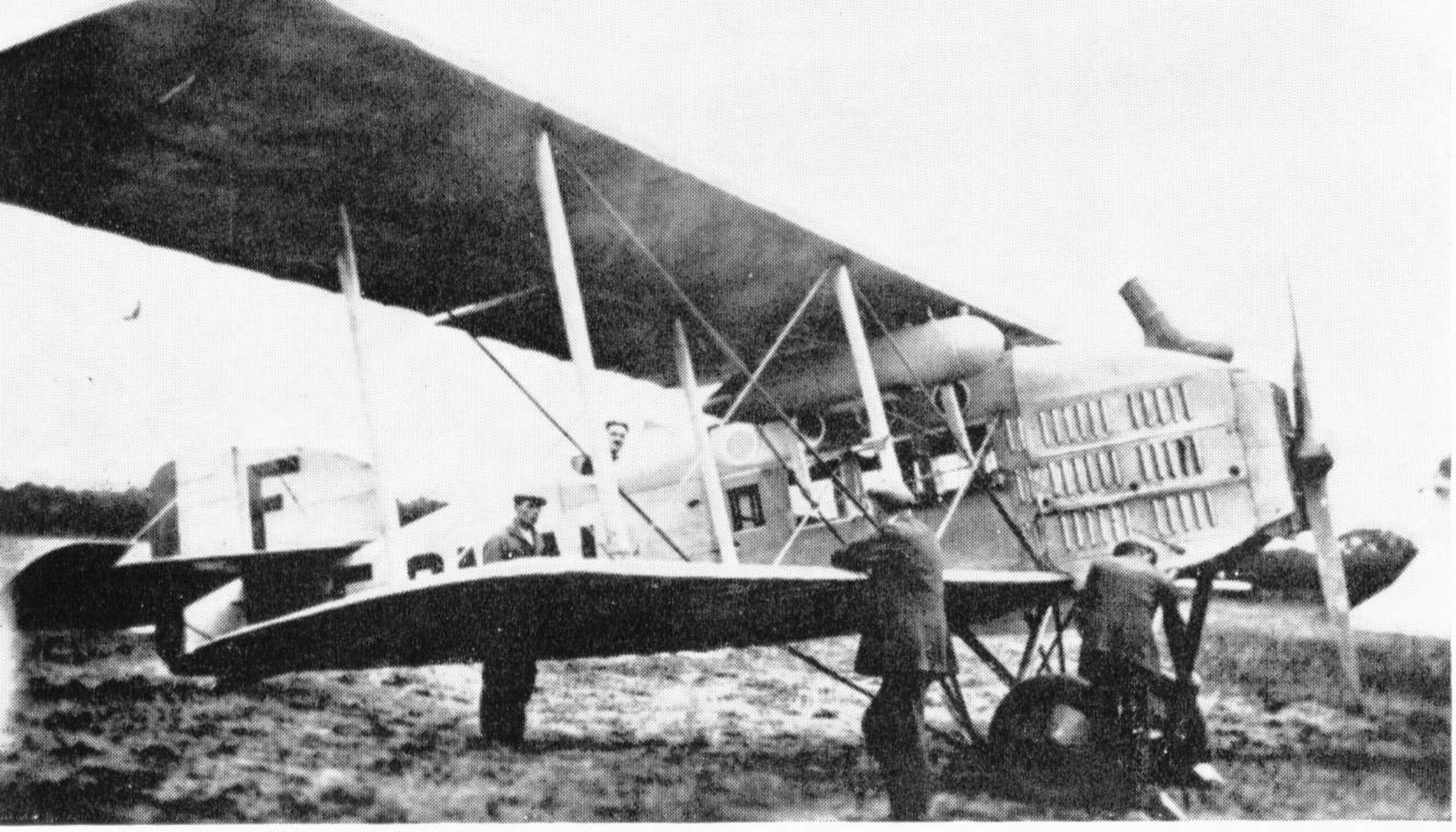
For air-mail transport, containers were attached to the lower wings, and a cabin version with seats for two passengers was built as the Breguet 14T. The cabin was in line with the wings; the pilot sat above and behind, as on the B.A.T. F.K.26; and the fuel load was carried in streamline tanks slung under the upper wing. The Breguet 14T was used with considerable success by the *Compagnie des Messageries Aériennes*. A similar passenger conversion of the Breguet 16Bn2 was built for the C.M.A. as the Breguet 18T, but this seems to have been discarded in favour of the Breguet 14T2, a further development with seats for three passengers.

At about the same time as Louis Breguet created the C.M.A., a Toulouse industrialist, Pierre Latécoère, began the first stages of the most ambitious air-line project of the time: the so-called South American route. On the Eastern side of the Atlantic, by progressive extensions, the route had reached Dakar by 1925, and its South American counterpart ran from Natal to Santiago di Chile. The *Lignes Aériennes Latécoère* used, in all, 106 Breguet 14s, some being flown as single-seaters with mail panniers under the lower wings. Others carried the mail in the rear fuselage, the mail-bags providing a seat of dubious and variable comfort for the Moorish interpreter who had to be carried in case of a forced landing in rebel-held territory.

Latécoère displayed resourcefulness in his efforts

A Breguet 14T, No. 1831, F-JAGB, of Louis Breguet's transport Compagnie des Messageries Aériennes. (Photo: Jean Noël)

Latécoère cabin conversion of a Breguet 14. In this aircraft the pilot occupied the normal front cockpit and an enclosure of uncouth appearance was fitted over the rear cockpit. (Photo: Jean Noël)

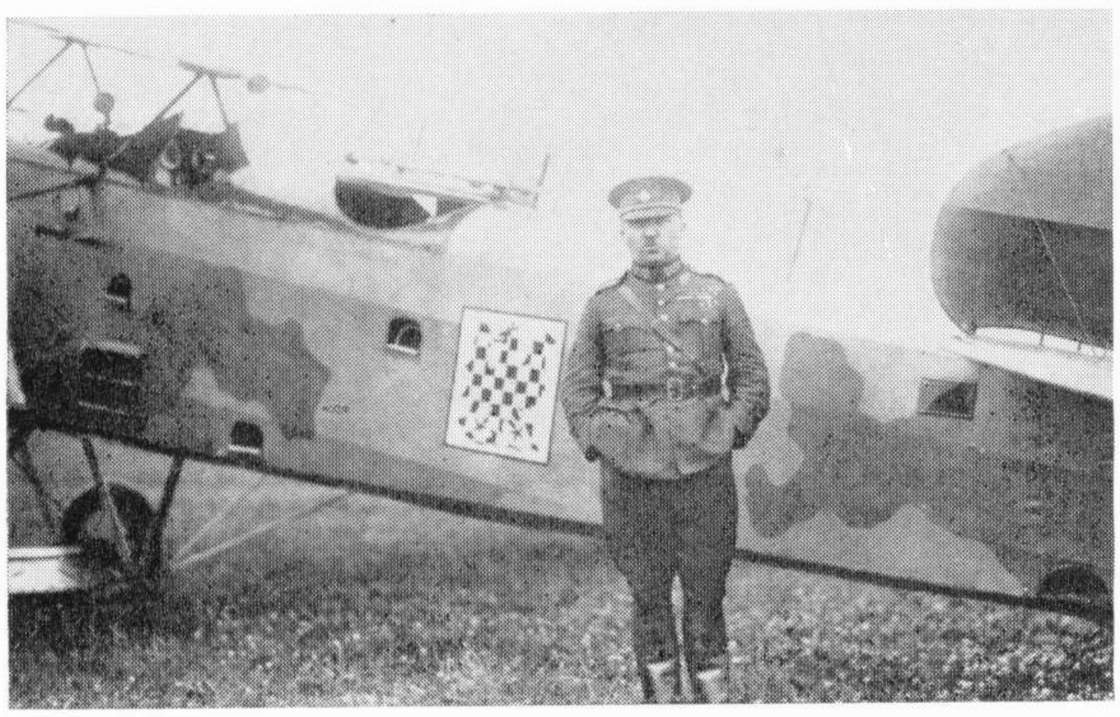


*Breguet 14T*bis *with the improved cabin arrangements and additional windows that distinguished it from the 14T. The bracing of the interplane fuel tanks to the intersections of the flying and landing wires is noteworthy.*

to exploit the Breguet's reliability, for his F-AEIU was equipped experimentally for in-flight refuelling. He also made a passenger-carrying conversion of the Breguet 14 with a hideous cabin enclosure behind the pilot's cockpit.

Further modifications to the Breguet 14T produced the 14T*bis* of 1921, distinguished by its revised cabin window arrangements. A floatplane version existed, and the 14T*bis* provided the basis of the ultimate ambulance version which, as described above, served in Africa, Madagascar and Indo-China. In 1920 Louis Breguet had founded *La Compagnie des Transports Aériens Guyanais* to provide aerial transport in French Guiana, and the company's fleet ultimately included several Breguet 14T*bis* seaplanes.

Other countries using Breguet 14s on commercial operations included Belgium, Siam, Brazil and Sweden, where the Swedish Red Cross operated two Breguet 14T*bis* with interchangeable wheel, float and ski undercarriages. The Belgian civil Breguets operated by S.N.E.T.A. were probably obtained from the Belgian *Aviation Militaire*, for, like their military counterparts, they had Fiat engines. One Breguet, apparently a 14B2, was given the U.S. civil registration N-18N as late as 1929, when it was owned by G. Lum of Chicago.



General Cecek, a well known officer of the Czechoslovak Army by a Breguet 14 of the 2nd Air Regiment at Olomouc. Note the Regiment's badge. Date: 30th July, 1925.

SPECIFICATION

POWER

300 h.p. Renault 12Fcx, 310 h.p. Renault 12Fcy, 320 h.p. Renault 12Fe, 320 h.p. Renault 12Fe with Rateau turbo-compressor, 350 h.p, Renault 12Ff, 400 h.p. Renault 12K, 260 h.p. Fiat A-12, 300 h.p. Fiat A-12*bis*, 600 h.p. Fiat A-14, 285 h.p. Lorraine-Dietrich 8Bd, 370 h.p. Lorraine-Dietrich 12 Da, 390 h.p. Lorraine-Dietrich 12E, 400 h.p. Liberty 12, 350 h.p. Panhard 12C, 340 h.p. Panhard 12D, 360 h.p. Rolls-Royce Eagle VIII (in Nakajima B.6).

DIMENSIONS

With original ailerons : Span, upper, Bre. 14A2 and 14B2, 14 m. 364 (47 ft. 1¼ in.); lower, originally 12 m. 400 (40 ft. 8 in.) on Bre. 14A2, 13 m. 664 (44 ft. 9·8 in.) on Bre. 14B2.
With balanced ailerons: Span, upper, Bre. 14A2 and 14B2, 14 m. 860 (48 ft. 8·9 in.) ; lower, Bre. 14A2, 13 m. 664 (44 ft. 9·8 in.), Bre. 14B2, 13 m. 284 (43 ft. 6·9 in.). Length: 8 m. 870 (29 ft. 1·2 in.). Height: 3 m. 300 (10 ft. 9·9 in.). Chord: Upper 2 m. (6 ft. 6·7 in.), lower 1 m. 900 (6 ft. 2·8 in.). Gap: 1 m. 700 (5 ft. 6·9 in.) at fuselage, 1 m 900 (6 ft. 2·8 in.) at 4 m. span. Span of tail: 4 m. 650 (15 ft. 3 in.). Wheel track: 1 m. 910 (6 ft. 3·2 in.). Tyres: 800×150 mm. Airscrew diameter: (Ratier série 34 with Renault, Ratier série 67 with Liberty) 2 m. 940 (9 ft. 7½ in.).

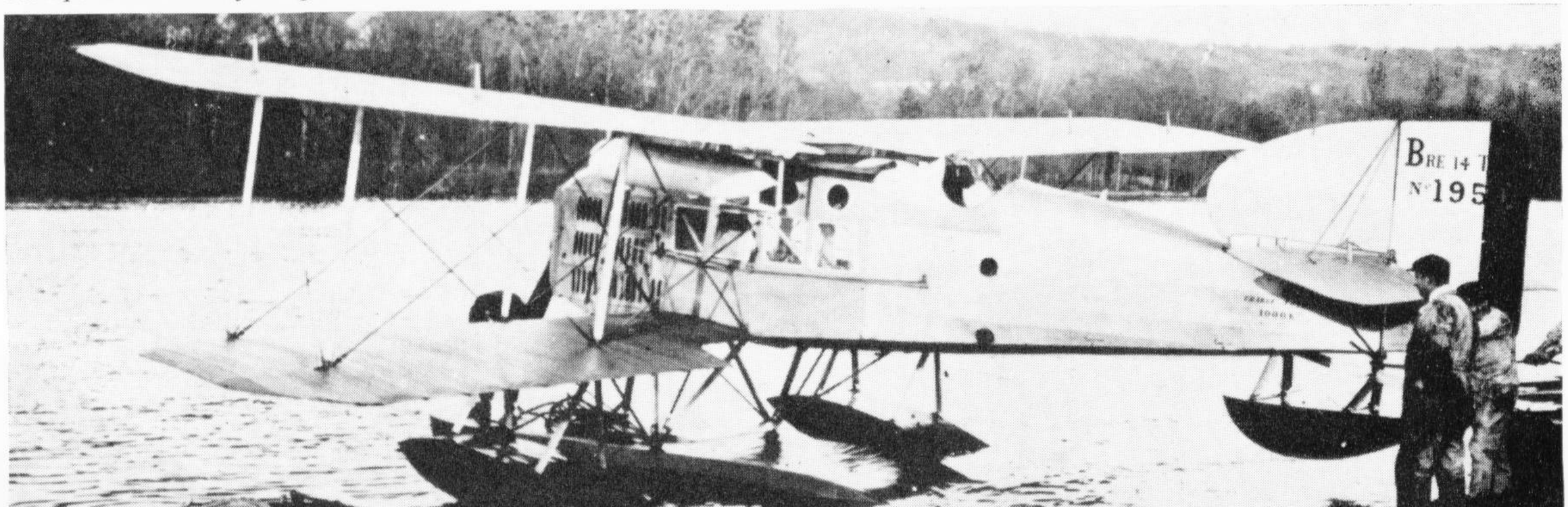
AREAS

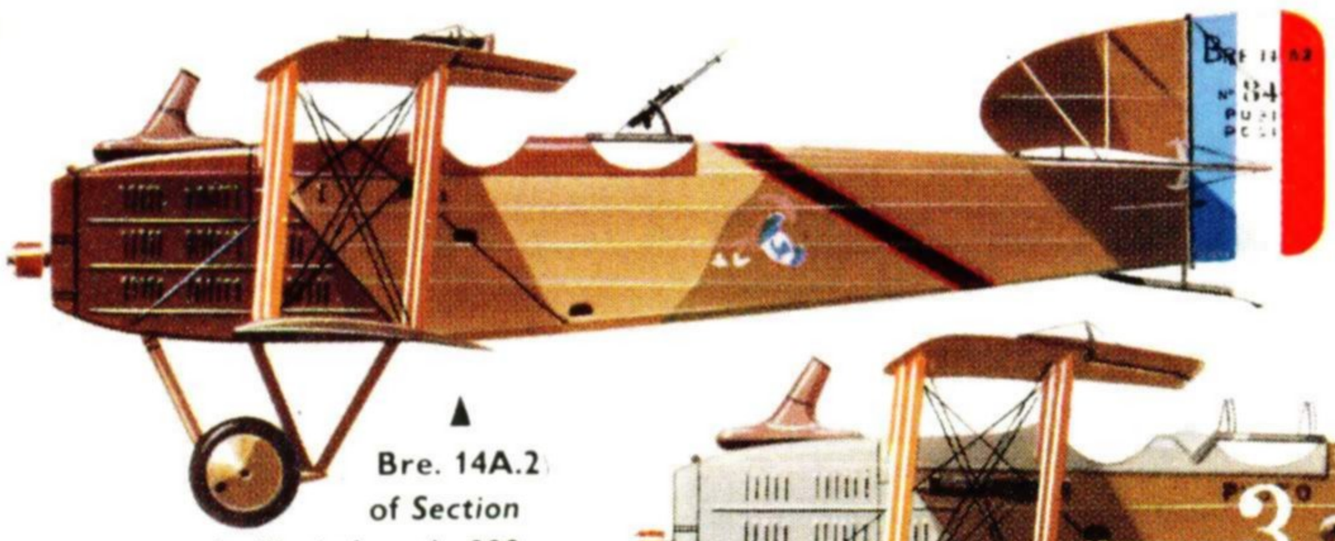
Wings: Bre. 14A2, original ailerons, 47·5 sq. m. (511·3 sq. ft.); Bre. 14A2, balanced ailerons, 49·2 sq. m. (529·6 sq. ft.); Bre. 14B2, original ailerons, 50·2 sq. m. (540·4 sq. ft.); Bre. 14B2, balanced ailerons, 48.5 sq. m. (522 sq. ft.). Tailplane 2·200 sq. m. (23·7 sq. ft.). Elevators, 4·100 sq. m. (44·1 sq. ft.). Fin, 1·050 sq. m. (11·3 sq. ft.). Rudder 1·500 sq. m. (16·1 sq. ft.).

ARMAMENT

Breguet 14A2 : One fixed 0·303 in. Vickers machine-gun on port side of fuselage; the observer normally had a double-yoked pair of 0·303 in. Lewis guns on a T.O.3 or T.O.4 rotating mounting on the rear cockpit. In several cases the pilot's Vickers gun was replaced, or possibly supplemented, by a fixed Lewis gun mounted centrally above the upper wing. Four 120 mm. bombs.
Breguet 14B2 : Pilot's and observer's armament as on Breguet 14A2; later, an additional Lewis gun was fitted to some aircraft, firing downwards and rearwards through the floor of the fuselage behind the observer's cockpit. Bomb load of 32×115 mm. (8 kg.: 17½ lb.) bombs or an equivalent load of bombs of larger calibres.
Breguet 14B1 : One fixed Vickers gun as on Breguet 14A2 and 14B2. Bomb load as Breguet 14B2.

*Floatplane version of Breguet 14T*bis. (Photo: Jean Noël)

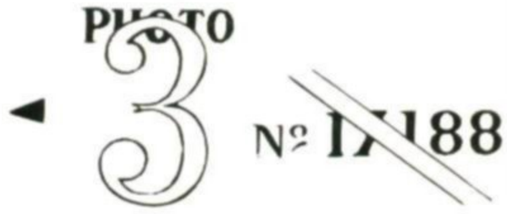




Bre. 14A.2 of Section *Artillerie Lourde 220*.

Insignia of *Section Artillerie Lourde 220*.

Bre. 14A.2, No. 17188, equipped for photo-reconnaissance duties; unit unknown.



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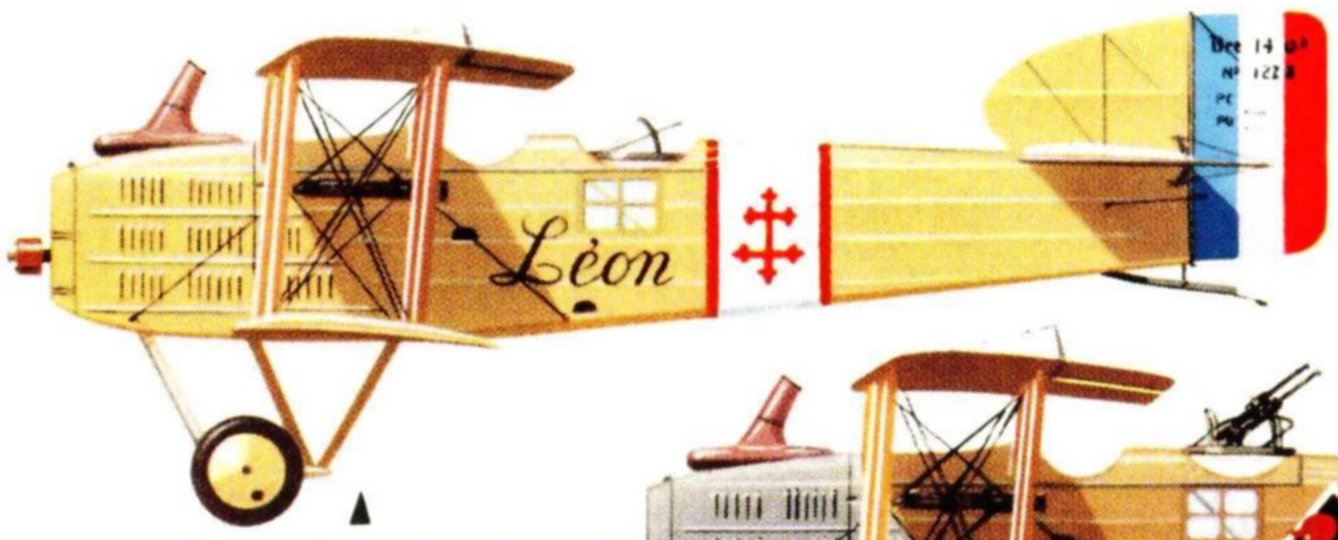
Fuselage marking detail.

Fiat-engined Bre. 14A.2 of Belgian *Aviation Militaire*.



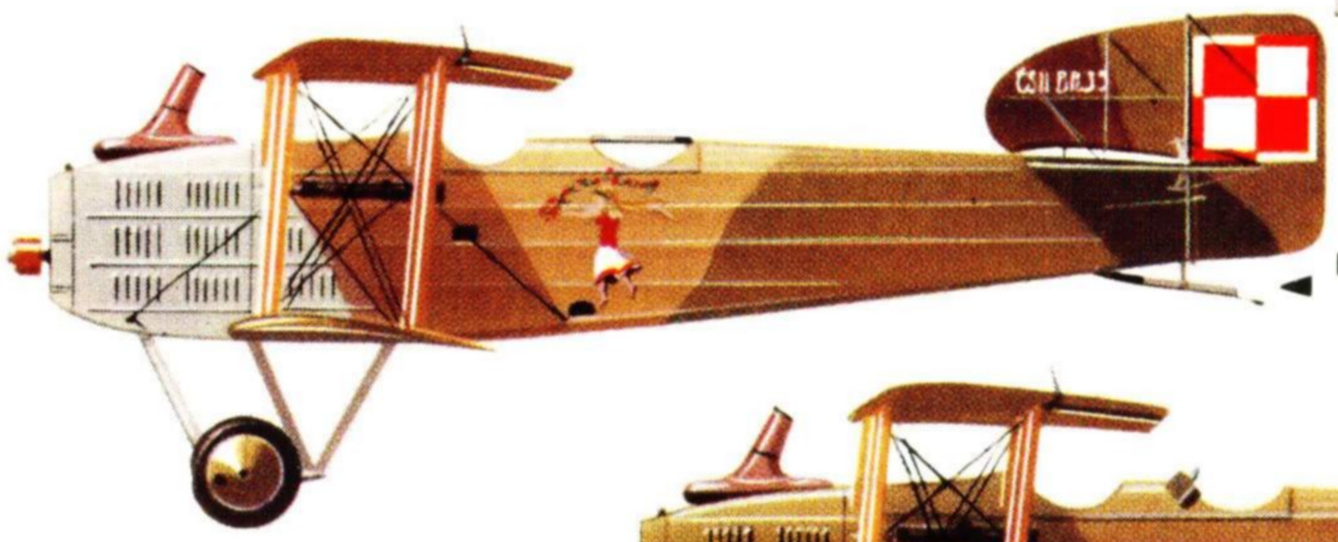
Bre. 14B.2 of *Escadrille* BR 504, Salonika.

Belgium, wing marking.

Bre. 14B.2 of 96th Aero Squadron, U.S. Air Service.

Insignia of 96th Aero Sqn.

Fiat-engined Bre. 14E.2 trainer; 7th American Instruction Center, Clermont-Ferrand, France, 1918.



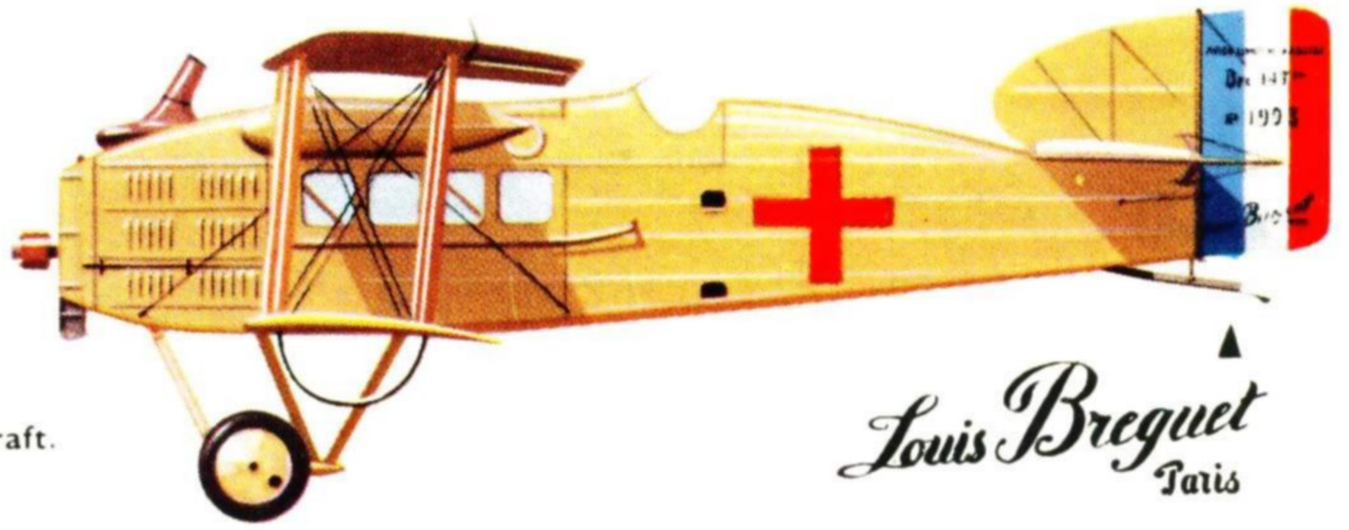
Bre. 14A.2 of No. 16 Reconnaissance Squadron, Polish Air Force; East Poland, 1920.

U.S.A., wing marking.

Insignia of No. 16 Reconnaissance Sqn.

Bre. 14A.2 of Polish Air Force, 1922-23.

AVION LIMOUSINE SANITAIRE



Post-war Bre 14T *bis* ambulance aircraft.

Louis Breguet Paris

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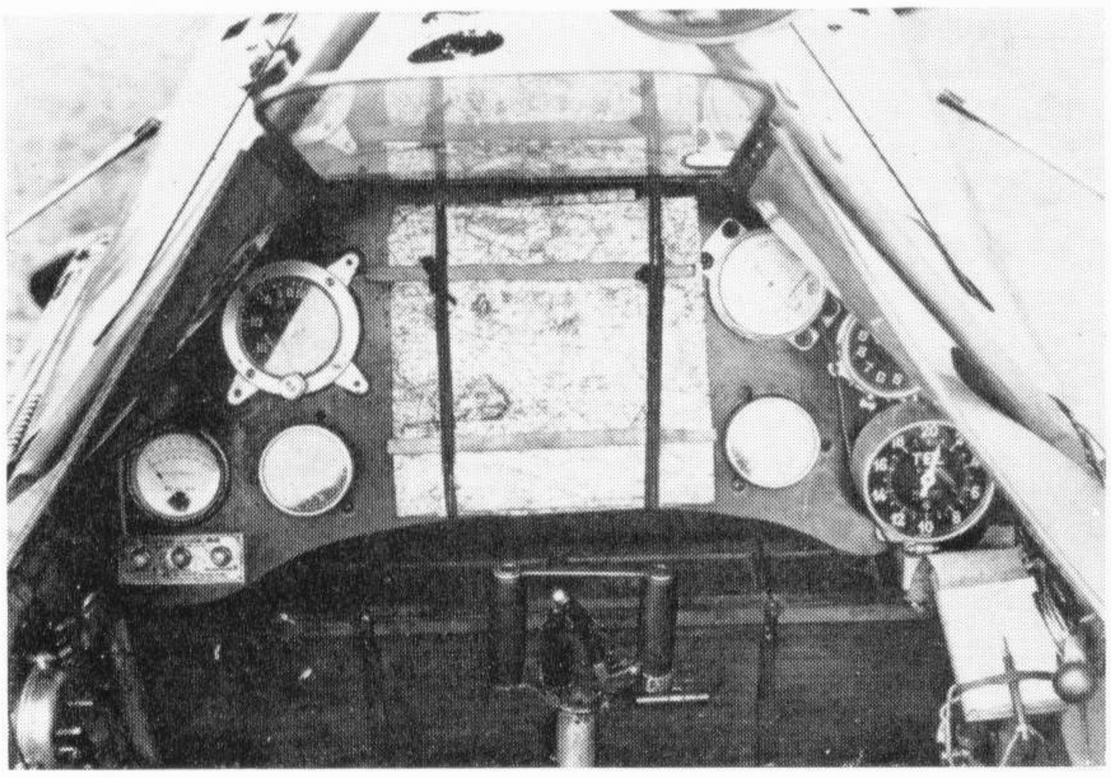
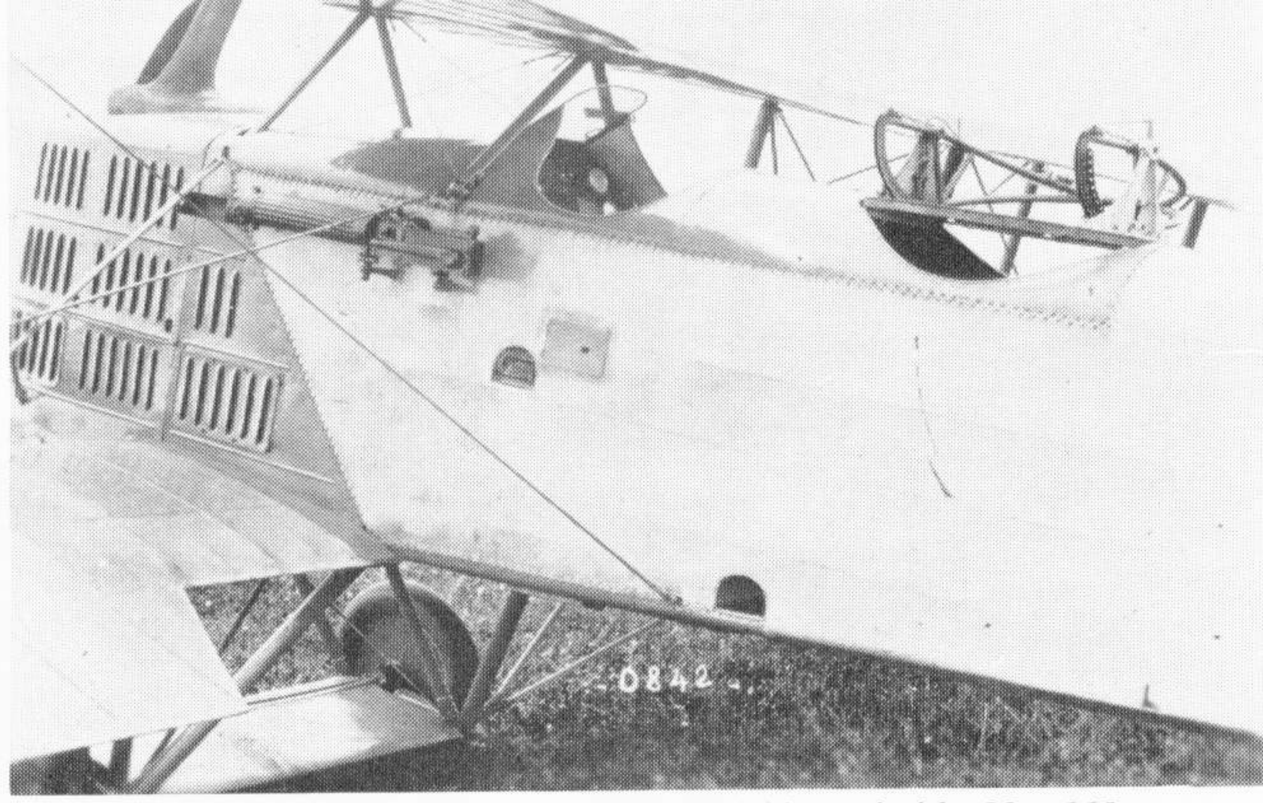


Pilot's cockpit of Breguet 14, probably a 14A2.
(Photo: Musée de l'Air Moreau 1727)



Close-up of cockpits on early Breguet 14A2, probably No. 665. The gun mounting on the rear cockpit is a T.O.4.
(Photo: Musée de l'Air 0842)

standards of the time, were substantial. A few were bought by the British War Office for the Royal Flying Corps; these were of slightly different types with various installations of Gnome and Salmson (Canton-Unné) engines.

The outbreak of war found a number of the ungainly and unlovely Breguet U-3s in use as reconnaissance aircraft in the Alsace area with *Escadrille* BR 17. Louis Breguet himself flew as a military aviator in the early months of the war, and was awarded the Croix de Guerre for a notable reconnaissance flight, made on his Breguet 10 (160-h.p. Gnome) during the Battle of the Marne. This aircraft had twice the nominal power of the U-3s, which had the 80-h.p. Salmson (Canton-Unné) radial engine.

Louis Breguet recognised that military aviation would need aircraft with more powerful engines if useful military loads were to be transported over worthwhile distances. Although all earlier Breguets had been tractor aircraft, his first high-powered military aeroplane, the BU-3, had to be a pusher in order to satisfy the inflexible requirements of the French general staff, who insisted on a frontal position with uninterrupted forward vision for the observer. When André Michelin decided to present his country with 100 military aeroplanes he chose the Breguet BU-3. These Breguets were built in the Michelin factory at Clermont-Ferrand with the designation BUM, but this variant was more widely known as the Breguet-Michelin. The name Breguet-Michelin continued to be applied to Michelin-built Breguet pushers of later types.

In the summer of 1915 the French Ministry of War held a competition of *avions puissants* to find the best type of aircraft that would carry a bomb load of 300 kg. (660 lb.) at a speed of 120 km./hr. (75 m.p.h.) over a minimum distance of 600 km. (375 miles). The declared winner of the contest was the Breguet SN-3, a development of the BU-3, despite the fact that the Paul Schmitt Type VI had proved to have a better performance. The sole reason why the Breguet was preferred was its pusher configuration: the Schmitt was a tractor biplane that did not give its observer the unobstructed forward outlook demanded unequivocally by the general staff.

The Breguet SN-3 developed into the Breguet IV, V and VI, which were built in substantial numbers. They saw operational service in several rôles but had no spectacular success. Components of the Breguet V were used in the enormous three-engined Breguet XI *Corsaire* of early 1916, which had been designed to meet an official requirement for a heavy bomber. Although the *Corsaire* did more than was required of it by the specifications for the competition it was not developed. The official specification had conjured up a number of improbable aircraft, none of which was a practical proposition, and the general staff then apparently withdrew in bewilderment from their attempts to define their requirements.

Breguet's belief in the tractor biplane remained unshaken: his experience with the BU-3 and its pusher descendants merely confirmed it. In June 1916

A later production aircraft, No. 717, with modified rudder having its lower edge more or less in continuation of the lower line of the fuselage. The observer's gun mounting is a T.O.3, a copy of the British Scarff mounting. (Photo: Musée de l'Air 01105)